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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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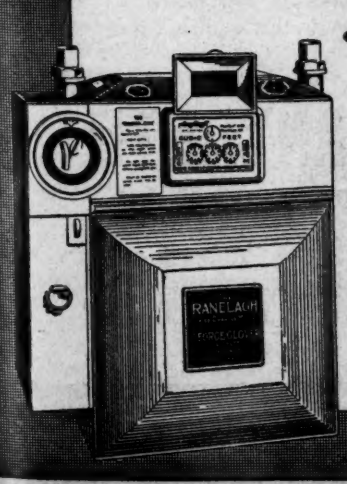

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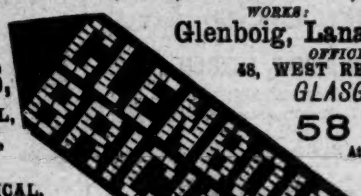

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VOL. CLXVII., No. 3194.] WEDNESDAY, JULY 30, 1924. [76TH YEAR.

EDITORIAL NOTES.

National Economy and Coal Utilization.

"CO-ORDINATION" and "CONSERVATION" of our fuel supplies were the keynotes of the First World Power Conference; but it seems to us, after reading many of the papers, that one of the impossible things in this regard is to attempt to co-ordinate the fuel supplies of the world. We may learn of what other countries are doing in the way of co-ordination, and the lessons may be to us of directive value. But the great thing is for each country, so far as is economically possible, to co-ordinate and to conserve its own native fuel resources. When, too, we consider the problem of the conservation of fuel and the co-ordination of its use, it must be with no narrow mind—full meanings must be given to the terms, and survey must be on broad lines. It is the requirements in the matter of utilization that need to be co-ordinated as much as is economically feasible, in order to realize the maximum conservation of resources, and to serve the maximum ends. There was a torrent of words during the conference as to what electricity can do, and as to its merits. But in considering all that was said in those respects, it is necessary for this country to discard much that was heard as to what is done in countries blessed with extraordinarily good supplies of water power. Experiences there are not applicable here, where coal or coke, gas or oil, must be used for generating electrical energy. And in those sections of the conference where electricity was most talked about, little was heard as to proposals by which the electrical industry could or would help in the co-ordination of the utilization of our fuel supplies, and nothing was heard as to how the generation of current by means of coal could assist in conserving our reserves of that precious material. Perhaps that is excusable, seeing that electrical energy is only generated at a 7 or 8 p.ct. efficiency in many electricity stations, and in those known as super-power ones the maximum efficiency is expected to be of the order of 18 p.ct. That is not a method of conserving coal for at any rate heating purposes, seeing that the combustion of the coal itself can yield a 20 to 24 p.ct. efficiency, though destroying all the valuable products that industries require in the same way that is done in electricity generation when steam is raised entirely by coal. Those electricity stations which use coke partially—say, up to 50 p.ct.—in place of coal are doing something to help both fuel co-ordination and conservation. But such stations are relatively few to the whole number. Notwithstanding, there is, as Mr. E. W. L. Nicol states, enough coke produced in this country to supply all the fuel requirements for the generation of the electricity at present publicly supplied.

Perhaps the most brilliant and practical exemplification of how our national fuel resources could be co-ordinated, conserved, and the maximum profitable use made of them is to be found in the papers read before the Gas and Fuel Section, some of which have been noticed in previous issues of the "JOURNAL." If those papers are taken together, it is perfectly clear that, while the carbonization of coal provides the best of possible routes to co-ordination of utilization, and thus conservation, of our fuel supplies, it also serves the national economy in many other directions. Conservation of coal cannot be served very much by merely raising the efficiency of appliances that burn the raw coal to ash; it is best served by the treatment of coal which separates its riches, and puts them all into a form which can either be used with greater thermal efficiency or promotes some beneficial purpose. The method of coal utilization which conserves to the highest possible degree its potential heat and places it at disposal in forms applicable to many purposes, which economizes capital and labour expenditure in industry, through obviating the necessity for coal storage and handling and ash removal, which provides the materials that promote employment in other industries, which assists in household economy by reducing labour, and so aids in the provision of more leisure, which helps to purify the atmosphere, maintains greater cleanliness for all things, and reduces the destruction of life and property—that is the system which has no equal, and it is the system of the gas industry. These attributes were pointed out by Mr. F. W. Goodenough in a paper which, in short compass, made a large survey of the position, and focussed attention upon matters which are essential to a full understanding of what is meant by, in the interests of national economy, co-ordination of use and conservation of our chief asset. If we pass to the paper by Mr. Nicol, we learn in it how coke from the carbonization of coal renders more efficient some of the electric power stations in London, Manchester, and elsewhere. It requires less furnace volume than coal; it facilitates the use of low grade fuel; it is smokeless; and the efficiency of combustion under suitable conditions is equal to that of pulverized coal. A tabulated statement in the paper shows how the efficiency and duty of steam-raising plant is increased by the use of coke sandwiched with the coal. Where such constructive co-ordination can be effected with beneficial results between two industries, one realizes instanter the real objective of this First World Power Conference. But the thoughts and the ideals of the heads of the industries must first be co-ordinated before the easiest and the safest path to the objective is pursued. The same applies to other industries, as was seen when dealing on July 16 with the paper by Sir Arthur Duckham, and as is shown in that by Dr. E. W. Smith, extracts from which are published to-day.

Co-ordination of power and conservation of coal do not stop there, as will be gathered by reference to the paper by Mr. W. Gordon Adam, B.A. There are the liquid products. The raw tars from vertical retorts and low-temperature carbonization are suitable for Diesel engines, and so is carburetted water gas tar, after filtration or centrifuging. For power purposes there are also the light distillates—benzole and toluole—obtained from tar or in greater amount by the scrubbing of gas. The gas-works and the coke-ovens between them produce 321 million gallons of tar; and taking the average production of motor spirit as 10¼ gallons per 1000 gallons of tar, from this source alone there would be a contribution to our motor spirit requirements of 3,290,250 gallons—not a great amount, but certainly something that is not negligible. Since the war most gas-works have discontinued the washing of gas for the extraction of benzole, partly owing to the low price of the crude, and primarily to the fact that the therm value of the hydrocarbons, *plus* the cost of extraction, is higher than the market value of the crude benzole. It may be that the work that is being done with such adsorbents as silica gel and activated carbon may bring to us a process which will make it worth while gas undertakings restarting the work of recovering benzole. At coke-oven plants it is the general practice to wash the gas for its extraction; but, of course, with them the production fluctuates according to the demand for metallurgical coke. A greater constancy could be realized from gas-works if there comes a time when it will pay to treat the whole of the gas. A 66 p.ct. removal of benzole from the gas produced for town supply (or 1⅝ gallons per ton of coal carbonized) would be equal to 27 million gallons, and the total from gas-works and coke-oven plants would then be (say) 45 to

50 million gallons a year, in present circumstances. With the progress of the transference of domestic and industrial coal to treatment at gas-works, the quantity of benzole would increase; and it is highly desirable that the country should be as far as possible self-dependent in respect of motor spirit. But a condition precedent to this happening so far as gas-works are concerned, must be that the market value of benzole is higher than its therm value—taking a gallon of benzole to be equivalent to 1·62 therms. The reduction of the price of gas per therm, and the lowering of benzole recovery costs, would help to produce the appropriate conditions. Then, as Mr. Adam points out, there is also the possibility of utilizing hydrogenated coal-tar products. The contributions of the coal-carbonizing industries to the solution of the power problems of this country grow in possibility; and co-ordination and conservation of our fuel and power supplies seem to be very much in the path of the gas industry and of the sister industry of metallurgical coke production.

Any interested, competent tribunal of men who had under consideration the whole of the papers that were presented at the First World Power Conference would unquestionably come to the conclusion that the Gas and Fuel Section made perhaps the most powerful contribution to the furthering of the capital and real purpose of this remarkable gathering at Wembley.

Unclean Coal.

ONE of the features of the World Power Conference which will have struck the coalowners somewhat forcibly is that the wave of demand is growing for cleaner coal, which means a more scientific treatment at the pits, in place of the crude production at present. While there is purification in some cases, the major part of the coal is still put on the market in an unfinished state. We think, however, the coalowners will not be able indefinitely to resist the claim for a greater refinement. People are getting tired of paying for useless material at the price of good coal, and of bearing the cost of the load of uneconomy which is distributed throughout the country owing to neglect at the pits. One of the things that the Labour Government profess their desire to do is to make industry more efficient (of course, we do not agree that their plans will all be effective) with the view of enabling it to pay higher wages and give better conditions to the workers. From what Mr. Shinwell, the Minister for Mines, has said, it is manifest that the Government realize that one of the great sources of uneconomy to industry and everybody else is the percentage of useless material raised from the mines, conveyed about the country, and handled in factories and other works; and this seriously depresses the level of economy and efficiency that could otherwise be attained. All this waste throughout the country goes on because the greater part of the coal is not efficiently refined at the pits.

Something as to what the impurity and moisture in coal means is especially found in the papers by Dr. E. W. Smith and by Messrs. F. S. Sinnatt and H. Eustace Mitton. Not only in the latter paper, but in the discussions in which he took part, Mr. Sinnatt (who is now a member of the Fuel Research Board's staff) was particularly strong on this question of coal purification as being an important element in the work to be done to produce greater fuel economy and efficiency in the national interests. It is true that all coal does not require treatment, but a considerable part of it does. Dr. Smith reminded those present during the reading of his paper that Sir Richard Redmayne estimated that 45 p.ct. of the coal produced is small, and that of this coal only 4 p.ct. is washed—the remainder being distributed unwashed. It can be safely assumed that the ash content of this coal will average at least 10 p.ct., while washing would bring it under 5 p.ct. The 10 p.ct. is a friendly and modest average. Some coals, according to Dr. Lessing, may contain no more than 1·5 p.ct. of ash; but in a comparatively good coal he finds the total ash may be of the order of 10 p.ct., while in the case of slack it is 15 to 20 p.ct. Assuming that 240 million tons of the total output of coal are transported by truck, Messrs. Sinnatt and Mitton calculate that, if there was resort alone to hand-picking of the dirt from the coal, the transport of 7,200,000 tons of free dirt would be saved, with all the attendant troubles of dealing with the valueless material at the diverse places of use. But, of course, purification from incombustibles and depriving the coal of moisture can be carried much further than that. The enormous saving there would be to the country in transport alone, without the economies on works and the greater industrial efficiency that would be secured, is indicated by Dr. Smith when he points out that every ton of water and ash brought to London in coal from South Wales costs 13s. in addition to the price paid for the coal at the pit. About 10s. 6d. per ton, as railway rate and wagon hire, has to be added to the pit price of coal brought from Notts, Derbyshire, Warwickshire, Leicestershire, and Staffordshire; and 12s. for Yorkshire coal to London. Water and ash cost just as much to transport per ton as good coal. Coal is termed our greatest national asset, and so it is; it is called the chief of the key industries, and so it is; but the industry is certainly not living up to the station in which Nature has placed it. Besides the vast economies that would be produced if coal was better purified, and the higher efficiency of industrial plants, products would be greatly improved, and the costs to the consumer would be reduced—instances of which, as Mr. Frank H. Jones pointed out at the conference, are gas and coke.

The developments in the utilization of fuels make this question of purification more insistent than ever; and in the interests of their own economy and efficient working, collieries should seek to market their products with a higher degree of purity. They know as well as Mr. Sinnatt and Mr. Mitton that all types of coal—large, small, and duff—can be purified at small cost; and this allows of a much greater percentage of impurity to be recovered with the coal. This should permit of the maximum amount of coal being secured from a pit, and therefore a greater output per man. This being so, portions of seams, especially the smalls, and whole seams which contain a high percentage of ash or other objectionable constituents, could be mined, and the pure coal extracted. Naturally, seams yielding large percentages of small coal become more valuable as the efficiency of purification processes increases. Furthermore with the recognition in industry that coal purity means greater works efficiency, there is a larger demand for washed varieties; and the washery duff need not go begging. As Messrs. Sinnatt and Mitton point out, furnaces to deal with products containing a high percentage of ash are now common; and so there are markets for such products (though containing up to 40 p.ct. of ash) within easy distances. But purchase of such products should be upon a calorific basis.

The paper by the last two authors described how the system of getting the coal has a great bearing upon its preparation and suitability for the market. Every effort should be made to obtain the coal as large as possible. The competent and conscientious coal hewer can also effect a considerable reduction in the amount of impurities placed in the tubs. The various types of coal-washer are mentioned in the contribution; but probably at present not more than 25 million tons of coal are washed per annum in this country. Prominence is also given to the subject of dry-cleaning or pneumatic separation. In the opinion of the authors, though one cannot speak very definitely yet, this process is one which should be very carefully investigated, and every advance followed up closely. At the same time, no individual process of coal washing or purification can be singled out as being pre-eminently suitable for all coals. Each colliery, its coals, and the requirements of its customers must be carefully studied, and the system most appropriate to the conditions must be adopted. It is satisfactory to learn from these students of the subject that there is little doubt that, at the present rate of progress, the time is not far distant when every colliery will possess a modern system of coal preparation. We hope this is so. The men of the gas industry will be among those who will heartily welcome a change from a crude to a refined state of coal supply. Then from each coal-using industry, additional benefit for the country will emerge. It is far better to deal with impurities at their source than to broadcast them over the country.

Coke Sales and Moisture Content.

The Public Control Committee of the London County Council have, after investigation, come to the conclusion that the risk of the fraudulent practice of adding water to coke by retailers has been exaggerated—at any rate, it is considered that the disadvantages of not selling by weight are far greater than the risk. We are pleased this is the deliberate opinion of the Committee as the result of their inquiries. They do not say there is not a certain class of

coke retailers who are prepared to run the risk if it is worth while. The Committee could hardly say this, seeing that they have established the fact that substantial short weight or measure in the sale of coke is of somewhat frequent occurrence with some unscrupulous traders.

It will be remembered that not long ago the Committee recommended that there should be legislation providing that all coke should be sold by weight. Since then, they have had before them a deputation from the Society of Coal Merchants who have no objection to coke sales being by weight, but foresee certain difficulties which to us do not appear to be of a formidable or insuperable order. By the London merchants purchase is made of coke not only from the London gas-works, but from outside sources. When the latter is the case, the coke has to be weighed by the merchants' own servants for delivery to the customers. We see no difficulty in such a case, as, the merchants' own employees being responsible for the weighing, there is no excuse for deficient deliveries. Then the other "difficulty" appears to be that coke purchased from the London Gas Companies is, in the main, weighed for delivery to the consumers by the servants of the Companies at the gas-works. That again is not a difficulty. The Committee themselves apparently do not think much of it, as they have no doubt that it would be an easy matter of a working arrangement between the Companies and the merchants, whereby the latter would be satisfied that these weighings were reliable. There would be no difficulty about that so far as we can see, if the merchants are not at present satisfied. The fact of the matter is these two difficulties show that the merchants have been hard put to it to find something to mitigate the case the Committee framed against the coke retail trade through erring participators in it. Among the methods of fraud cited in the report was the changing of coke by certain retailers to sacks which could not contain the recognized weight. Naturally, honest retailers do not wish the public to think they are all involved in such fraudulent traffic.

As to the likelihood of the addition of water to coke for the purpose of increasing its weight, we agree with the Committee that the risk of this is not great. They should, however, bear in mind that the tendency of gas-works is more and more to ensure that the proportion of moisture in coke as it leaves the works is as low as possible; and that the greater the success in this direction, the larger the scope for adopting the illicit practice of adding water for the express purpose of increasing the weight. There would be no harm (as recommended by the Committee) in making it a penal offence to add water beyond the normal content of moisture as it leaves the gas-works. As Mr. R. E. Gibson stated in his paper before the Institution of Gas Engineers a few weeks ago, every pound of moisture in the coke not only takes the place of a pound of fuel, but it has to be driven-off at the expense of a further quantity of fuel before useful work can be done. Taking an absolutely dry coke as having a value of 100, the relative value of coke containing 10 p.ct. of moisture would be 88·9, and if it contained 20 p.ct. of moisture 77·8. These figures are sufficient to indicate that, though the risks of fraudulent watering are not great, it would be as well to have the power to bring the offender to book should such a practice be discovered. It would be of little use for gas undertakings to do their utmost to deliver coke with as low a moisture content as possible if their efforts were to be rendered nugatory by unscrupulous coke retailers.

Electrical Omissions in Comparisons.

THERE has been a little controversy at Swansea respecting the relative costs of lighting two schools by gas and electricity. We should not have made prominent reference to it; but we must again protest against cost comparisons being made and published, to the advantage of either one illuminant or the other, without all factors bearing upon the result being disclosed. The question on this occasion is raised over lighting the Pentrepoeth School at Swansea by electricity and the St. Helen's School by gas.

The figures given by the Borough Architect (Mr. E. E. Morgan) show that the cost at the electrically lighted school was £8 19s. 10d. for the six months ended March, while that for the gas-lighted one was £19 7s. 5d.—the relative cost per hour per light being 0·306d. and 0·638d., and per 100 hours per light 2s. 6·6d. and 5s. 3·8d. "Meteor" of the "Electrical Times" quotes these costs; but we suppose it was too much for him to see that a figure which governs the whole matter was missing from the comparison—the relative illumination afforded. For scientifically trained electrical engineers, "Meteor" thinks it sufficient to make comment in this way: "Of course"—why, "of course!"—"as soon "as these data were published, there was a letter from the "Gas Company, who protested that the test was not fair as "the gas-lamps at St. Helen's School afforded three times "the candle power obtained from electricity at Pentrepoeth." We invite "Meteor" to be bold and not cowardly, and to say positively whether the Gas Company are telling the truth or a falsehood. They will be very pleased to have his statement in print, and for it to have the same prominence as his previous comment. If they are telling the truth, then there is no fair base to the cost comparison, or to "Meteor's" worthless and puerile reference to the matter. All "Meteor" added was: "The Borough Architect's com-"ment is that he considers the electric lamps at Pentrepoeth "School give a cheaper and better illumination; and he "asks the Committee to come and judge it for themselves." Is what the Borough Architect "considers" sufficient proof for "Meteor?" Has the editorial writer in the "Electrical Times" not been better trained than that? Different people, different views. We prefer relying upon a photometer in these matters. Now we ask "Meteor" where and when the Borough Architect of Swansea made the statement attributed to him, because we understand that gentleman has in a letter denied having expressed the opinion that "he considers the electric lamps at Pentrepoeth Schools give a cheaper and better illumination;" and a copy of this denial we believe has been inserted in the local papers. We press our journalistic friend to give an answer to our questions, and not to evade them.

What are the facts in this case, which are ignored by the writer in the "Electrical Times?" In the Pentrepoeth School there are fifteen 60-watt electric lamps each giving 50 c.p., or a total of 750 c.p. In St. Helen's School, there are fifteen gas-lamps, each giving 160-c.p., or a total of 2400 c.p. Had the Borough Architect stated that he would have been content with 750 c.p. at the St. Helen's School, the Gas Company could have provided this at a cost of 0·169d. per light per hour. In fairness in these matters, let us have comparables and not incomparables, and above all things let there be no hitting below the belt—as there has been in this case—by misrepresentation through ignoring an essential factor. There is another point, and the Gas Company are justified in remarking on it, and in making a protest. Some time ago, the Company drew attention to the faulty fittings then in use in St. Helen's School; and with the object of reducing the extravagant use of gas, they sought the opportunity of modernizing the installation. We can well understand the Company, on the publication of the deficient data, writing to the Borough Architect: "It is re-"grettable that, after our endeavours in this direction, we "should be placed in a false position by what we contend to "be an unfair comparison of the respective lighting costs." If we knew that "Meteor" had the comparative lighting figures in his possession when he wrote and published his comment, and yet refused to include them, then we should say that he does not know the meaning attributed even by a schoolboy to the term "cricket." Perhaps after this he will be more careful over his comments, and see that he is in possession of all the essential data.

The Cantor Lectures.

Some four months ago Mr. E. V. Evans, of the South Metropolitan Gas Company, delivered three Cantor Lectures at the Royal Society of Arts. They attracted a large amount of attention from those concerned scientifically and practically in coal-carbonization processes. To-day we commence the publication of a résumé and criticism of the lectures by Dr. W. B. Davidson.

The Diminished Coal Trade.

When considering the figures as to the export coal trade during the past six months, and noting the large decline there has been in the exports, it is necessary to remember that, in the corresponding period of last year, there were at work influences which abnormally promoted demand from abroad. The total quantity of coal exported in the first half of this year was 31,131,057 tons, or no less than 8,677,824 tons below the shipments for the June half of 1923. On the other hand, the exports this year are better than in the June half of 1922, when they were

27,183,960 tons, or 3,947,097 tons less. On the other hand, in the first six months of 1913, the exports totalled 4,395,178 tons more than last half-year. The reduction compared with 1923 is entirely due to the lower demand from the Continent, seeing that the purchases for South America and other countries have somewhat improved. As a matter of fact, last year's windfall in shipments was something to be welcomed in view of the industrial depression in this country. As the industries revive here, it will be a good thing, in view of the lower production per man per day, to have a reduction in the exports. The average price per ton reached the lowest level in June—£1 3s. 5d. f.o.b.; the highest average price being in April (£1 4s. 11d).

Gas Coal.

In the month of June, the exports of coal of all sorts totalled 4,882,291 tons; in the same month of 1923, 6 588,651 tons; and in that of 1922, 4,793,648 tons. The respective values were: £5.728,045, £8,950,779, and £5.391,946. Although there was a considerable reduction in the general tonnage, gas coal was better than in the two preceding years. In the month 769,346 tons were shipped, as compared with 725,195 tons in June, 1923, and 663,185 tons in June, 1922. The values were respectively £882,101, £924,885, and £723,988. The average price per ton of gas coal in June was £1 2s. 11·17d. The quantity of gas coal shipped in the six months was 4,211,932 tons; in the corresponding period of 1923, 4,648,214 tons; and in that of 1922, 3,848,780 tons. The values were respectively £5,032,570, £5.629,505, and £4,267,693.

Shipments of Gas Coke.

Like coal, the exports of gas coke have not kept to the high level of 1923. Last month the shipments were 34,625 tons, or 25,372 tons less than in June, 1923, but nearly 500 tons higher than in June, 1922. In the six months, 442,717 tons were exported, which figure compares with 506,768 tons in the first half of 1923, and 327,525 tons in that of 1922. The value of the 34,625 tons shipped in June was £61,662. The average price per ton was £1 15s. 7·4d., which is nearly 6½d. better than the average for the six months.

Sulphate of Ammonia Exports.

Last month, the shipments of sulphate of ammonia fell considerably below those of June, 1923—the figure being 17,024 tons, as compared with 24,065 tons. In the six months, however, business has been good, having reached 134,549 tons, as against 123,560 tons in the first half of 1923. In the half-year, Japan has been our best customer with 41,021 tons. Spain and the Canaries come next with 37,597 tons; and the Dutch East Indies are placed third, with 15,353 tons.

Liquid Products.

In the six months ending June, this country exported 826,634 gallons of benzole, compared with 564,613 gallons in the first half of 1923. The naphtha shipped amounted to 144,811 gallons, as against 65,723 gallons; and the tar oil, creosote, &c., to 18,769,196 gallons, as compared with 26,204,279 gallons.

The Miners and the Coal Industry.

The Miners' Federation are anxious to push on with legislation which they consider necessary for the reformation of the industry which gives their members employment. There has been a conference with the mining members of the House of Commons, at which all sorts of subjects were discussed—nationalization of the mines, mining royalties, coal production, new national wages agreement, inadequacy of the Workmen's Compensation Act of 1923, and the miners' requirements for the further amendment of the Coal Mines Act. It was agreed to constitute a Committee of ten—five chosen by the mining members of Parliament and five by the Executive of the Federation—to formulate a political programme and policy for the industry. In this work apparently the owners are not to be consulted. A start is to be made with nationalization; and a Bill is to be drafted and introduced into Parliament as early as possible.

A Motor Spirit Duty Impracticable.

Intelligent anticipation, or perhaps inner knowledge, caused the fact to be known a few weeks since that the Departmental Committee on the Taxation and Regulation of Road Vehicles had failed to arrive at an agreement regarding the subject of their reference. They were to consider the objections to the present system of taxation of mechanically propelled road vehicles in the light of the experience gained, and to report whether a more satisfactory method could be devised, or the present system modified so as to meet the objections, and still produce a revenue equivalent to that of 1921-22. Their report has now been published. Five members out of ten signed the main document. It states that reluctantly the conclusion has been arrived at that no method of administering a motor spirit duty can be contrived which would not inflict grave inconvenience and additional expense upon considerable numbers of consumers of motor spirit (and of some kerosene) used for purposes other than the propulsion of road vehicles, or which could be relied upon to yield a certain revenue at a reasonable cost. Two other members agree with this conclusion, though unable to support recommendations relating to the incidence of taxation. Of the remaining members, two have reported in favour of a motor spirit tax, and one has submitted a separate memorandum. A number of modifications in the existing system of motor taxation are proposed in the main report. What a pity something could not have been done to give encouragement to the home production of motor spirit.

National or Local Agreements.

Many years were spent by the trade unions of the country to secure the settlement of wages and conditions of labour on a national basis; and eventually there was success on both sides in devising machinery for doing this. The employers did not initiate or seek this; but it has been proved that in existing circumstances the national basis has advantages in it, as well as disadvantages. Generally speaking, the trade unions prefer the national system, which is in working order and has fairly universal application. Now in the building trade there is a section of malcontents on the men's side who would prefer a return to a system of local adjustment of wages and working conditions. The employers, in a statement issued regarding the lockout as from Saturday last until a complete national settlement has been effected of questions in dispute, have expressed the view that a return to the local system would be disastrous to all concerned, and a waste of the laborious efforts of both parties during recent years to build-up an efficient national negotiating machine.

INSTITUTION OF GAS ENGINEERS.

Revision of Articles of Association.

A Special Meeting of the Institution was held in the Council Room at No. 28, Grosvenor Gardens, Westminster, S.W., on Wednesday last, when there was submitted for confirmation the resolution with reference to the amendment of Articles 6 and 7 passed on June 24 during the meeting in London.

Mr. J. Ferguson Bell (the President), who was in the chair, explained that the resolution was made at the request of the Advisory Committee on the Education Scheme of the Institution. It had for its object the offer of an inducement to the junior members of the profession to sit for the Diploma Examination.

The notice calling the meeting (a copy of which was in the hands of the members present) was agreed to be taken as read.

On the proposition of the Chairman, seconded by Mr. Samuel Tagg, the resolution was unanimously confirmed.

Article 6 now reads:

> 6.—Subject as aforesaid every candidate for election or transfer into the class of Members shall not be under twenty-four years of age, and shall come within one of the following conditions:
>
> He shall have been regularly educated as a Gas Engineer, and either (1) shall have been prominently occupied in the conduct of a gas undertaking for at least five years at the time of his election or (2) he shall be in practice as a Consulting Gas Engineer, and in the opinion of the Council have acquired sufficient eminence in the said profession, (3) *or shall hold the Diploma of the Institution in Gas Engineering or Gas Supply, and shall occupy some responsible position in the engineering department of a gas undertaking.*

Article 7 now reads:—

> 7.—Subject as aforesaid every candidate for election or transfer into the class of Associate Member shall be not under twenty-four years of age (*unless he shall hold the Diploma of the Institution in Gas Engineering or Gas Supply*), and shall be actually engaged as a manager of a gas-works, or shall occupy some other responsible position in the engineering department of a gas undertaking.
>
> Note.—The amendment to the Articles is shown in italics.

The meeting terminated with an expression by the Chairman of thanks to those present for their attendance.

PERSONAL.

MR. J. FERGUSON BELL, M.Inst.C.E., President of the Institution of Gas Engineers, was elected an Honorary Member of the Société Technique de l'Industrie du Gaz en France at their Annual General Meeting on June 24.

We are pleased to be able to announce that Mr. W. G. BEAUMONT (of the firm of Messrs. W. G. Beaumont and Son), after a very serious illness, is now well on the road to recovery, and hopes again to visit his numerous friends in the near future.

MR. GEORGE JESSEL, M.C., the elder son of the Chairman (Sir Charles J. Jessel, Bart.) has been appointed a Director of the Imperial Continental Gas Association, in place of the late Mr. H. G. Newton.

MR. F. R. WESTON, B.Sc., who was appointed the first holder of the Gas Light and Coke Company's Fellowship, inaugurated in connection with the Department of Technology at the Imperial College of Science and Technology, last July (see "JOURNAL" for July 25, 1923, p. 357), has been re-appointed for the year commencing Oct. 1 next.

OBITUARY.

It is with regret that we have to record as having taken place recently the death of Mr. ALEXANDER MASTERTON, who, about three years ago, retired from the position of Engineer and Manager of the Edinburgh Corporation Gas Department, after a long period of faithful service to the city. Deceased, who was 68 years of age, was apparently in good health two days before the end came; but he suffered a sudden seizure, from which he never rallied. A native of Edinburgh, he received his early training as a civil engineer in the office of Mr. M'Crae, and after some experience in Fife entered in 1885 the service of the Edinburgh Gas Light Company as a draughtsman. Subsequently he was promoted to be Assistant Engineer under the late Mr. Robert Mitchell at the New Street Works, and later on under Mr. W. R. Herring. He acted as Station Manager at these works. In 1910 he received the appointment of Engineer and Manager to the Edinburgh and Leith Corporations' Gas Commissioners. He took an important share in the work connected with the erection and equipment of the new works at Granton.

The death has recently taken place of Captain WM. NEWTON, who for 42 years was Surveyor to the Hawarden Rural Council, and for the last 25 years had acted as Chairman of the Buckley Gas Company.

The death of Mr. WILLIAM WRIGHT, of Matlock, at the advanced age of 93, removes a prominent figure from gas circles in Derbyshire. Deceased rendered many years of useful public service on the Local Authorities of Matlock and Matlock Bath, and was a former Director of the Matlock and District Gas Company.

ELECTRICITY SUPPLY MEMORANDA.

WHILE Mr. Lloyd George, Mr. Garvin in the "Observer," and the Labour Party (we believe the "Electrical Review" may also be associated with these "experts") are advocating super-power stations and whatnot for the development of the electricity supply industry, a useful pamphlet reaches us from the Pennsylvania Public Service Information Committee, on the "Limitations of Super-Power and Giant Power." It is a summary of a lecture by Mr. Samuel S. Wyer. We read in it that the present is an age of loose thinking and slogans, and that the super-power and giant power ideas have ridden to popularity on a slogan wave. The electrical people give an interpretation to the word "cost" just as it suits their convenience; and at times—in fact, frequently—it does not include all operating expenses, let alone capital charges. Thus the charge that many cost-data given to the public are incomplete. For instance, it is a very common practice to refer to switchboard costs in a way that they embrace only the operating costs, without the fixed charges; sometimes fuel costs are put forward as constituting the one and only thing that matters in respect of expenditure, as though the generation of energy excludes all else. Further, the public and many of their leaders do not appreciate that the mere bringing together of a number of independent generating units for the creation of one large unit does not necessarily make for economy in the integrated plant. Of the total cost of generating electric power, about two-thirds is fixed, and goes on for each of the 8760 hours of the year. The carrying-out of the super-power idea, which means larger capital investment, will tend to increase this fixed cost. When statements are made that the large power station would be able to halve the cost of coal, the public, of course, jump to the unwarranted conclusion that this would halve the cost of power. The facts are that cutting the coal cost in two would lower the power cost only about 10 p.ct., and not by 50 p.ct. as the public have been led to believe. Nothing but the all-in cost shows the actual position.

The Super-Power Fallacy.

Another interesting part of the little pamphlet refers to heating houses by electricity. This work, we are told, is not within the realms of the practical. It would require much more coal to generate electric energy for house heating service than to burn coal directly in the house. To meet the normal heating demand in an average eight-roomed house (having about 15,000 c.ft. capacity), and without attempting to meet the extreme peak demand in very cold weather, there would be required 25 KW. of plant capacity. On the basis of an investment of $300 per KW. of plant capacity in a super-power system—for everything from the power station to the consumer's meter—the eight-room house would require a public utility investment of 25 × $300 = $7500. Remembering that Mr. Wyer's lecture is based upon Pennsylvania conditions, the lecturer tells us that, from actual observed readings, the house would require in round numbers 60,000 KW.-hours per annum for heating service. At 4 lbs. of coal per KW.-hour, as measured at the consumer's meter (which would, of course, include stand-by and transmission losses on such a system), the coal that would be required for a year's heating service for such a house would be 60,000 × 4 = 240,000 lbs., or 120 tons (American 2000 lbs. to the ton). If the electrical energy required for the heating of the house was sold at 3 c. per KW.-hour, the annual cost to the consumer would be 60,000 × 3 c. = $1800! While the super-power station would save some expenditure on coal, it would not necessarily save dollars on the total power cost to the public. The public generally have been led to look upon super-power as a monkey-gland operation that is to rejuvenate American business. This is far from the truth.

Electricity Wastes Coal for House Heating.

The most destructive fire which has ever occurred in Ilford was witnessed at the beginning of last week. The big premises which were gutted were in the occupation of Messrs. Harrison Gibson, Ltd., who are house furnishers; and therefore one can well imagine that the stocked goods provided plenty of combustible material. The damage is computed at £50,000. The report before us states that the cause of the outbreak is believed to be the fusing of an electric wire. Of course, we shall be told that the belief is quite erroneous, though we cannot tell why denial should be more truthful than the assertion. Shortly before eight o'clock the premises to all appearances were in perfect order. Soon afterwards smoke was seen to be issuing from *above* one of the plate-glass windows. It is interesting to note the place from which smoke was first seen to be issuing, in view of the fact that the fire has been attributed to the fusing of an electric wire.

A Big Fire at Ilford.

The "Airdrie Advertiser" reports that on the 15th instant, a domestic servant, named Elizabeth Tait, was electrocuted at her employer's house. She was using an electric iron, when she fell to the floor. On examination, life was found to be extinct; death having resulted from electric shock. There are not only the risks of electric shocks; there are those resulting from overheating. A correspondent of the "Electrical Review" states that the better the make of electric iron, the greater the risk from overheating. Most housewives prefer an iron which will reach its working heat quickly, and maintain its temperature when in use with damp fabrics. If, says the writer, such an iron is allowed to remain at rest, with the current "on," the dissipation of heat is prevented; and the temperature of the iron rapidly rises until there is risk of fire. A good make of iron can burn through a table at 230° C.—often without damage to itself. Another point is that British irons are usually provided with a "back rest," while American irons have a separate stand. The writer of the letter favours the latter, as wrist strain is reduced, as well as the risk of the user's burning her (or his) fingers when raising the iron on end. The "Review" thinks the risks attending the use of an electric iron are infinitesimal. It points out that the employment of the back rest has resulted in broken terminals more than once; and the separate stand has proved preferable. The weak point is still the flexible connection. Possibly it was that weak point that the poor girl Tait found, and that resulted in her death.

Danger of Electric Irons.

The bases of charging for electric energy appear to be infinite. We have had no end of new proposals, but still they come The bi-part tariff system has had the fixed charge based on rateable value, floor area, connected KW., and perhaps other things. Now Mr. S. W. Baynes, the Electrical Engineer to the Borough Council of St. Pancras, has recommended a new basis. To promote the use of electricity for cooking, room heating, and water heating (as an abundance of consumers, using power for every possible purpose, must be secured), and in order to obviate dual wiring and meters, he proposes that the charge be £16 per KW. per annum, based on the "live" lamps, *plus* ¾d. per KW.-hour. The lamps in the dwelling-rooms—drawing and dining rooms and kitchen—are to be regarded as the "live" lamps; those in the bedrooms being disregarded so far as the annual charge is concerned. For example, in a house with three 40-watt lamps in the drawing-room, the same in the

Another Basis for Charging.

dining-room, and a 60-watt lamp in the kitchen, the annual charge for 0·33 KW. would be approximately £5 6s. 8d. What on earth have those lamps to do with the total consumption? Mr. Baynes himself states that twenty-seven consumers, using hired electric cooking apparatus, had been found to have used for heating and cooking eight times as much current as for lighting. Obviously the lower the candle-power of the lamps in use when the survey is made for calculating the fixed charge, the better off will the consumers be under the system. Very rarely one finds two houses, though of the same size, consuming the same amount of current for the different purposes. All schemes such as this St. Pancras one are indefinite, and inexact in their operation as between the consumers. The electricity patrons of St. Pancras who are satisfied with low-wattage lamps in their day dwelling-rooms will fare much better than those who require a generous amount of light.

The Critic and Prophet.

It is highly interesting and diverting to read the opinions which electrical people express as to the gas industry. The "Electrician" lately made mention of a comparison by Alderman J. H. Lloyd, who is Chairman of the Birmingham Corporation Gas Committee, a cultured man of great business experience, and who stands high in the estimation of the citizens of the capital of the Midlands. When he speaks of gas and electricity, he knows quite well what he is talking about, which is more than some other people do of whom there is knowledge. Alderman Lloyd (our contemporary states) recently said that the Department's increase in the output of gas last year was 1079 million c.ft., which, calculated into electrical units, was greater than the total output of the Birmingham Electric Supply Department in 1922-23, and nearly equal to the total output to March 31 last. The "Electrician" does not say whether the Alderman was telling the truth, or something else. But it vaguely remarks: "This form of comparison, which is becoming increasing popular in circles where they make gas, is interesting both technically and psychologically." The comparison has technical and commercial interest, but why "psychologically?" However, our contemporary thinks that, as the output of coal is not so great as before the war, it is a logical deduction that more of it is being made into gas, and therefore is being more efficiently used—a state of things at which the "Electrician" confesses it would be the last to grumble. It has not always been so amiable towards gas, as many gas men know. Perhaps it is trying to make a little sacrifice of its former convictions, appreciating that the facts of the position are hard and insoluble by mere words; or it may be that—being one of a family of technical papers—business connection and expediency dictate a milder attitude towards gas. Gas does not mind the "Electrician" occasionally giving vent to its feelings, though adverse. But this is surprisingly generous: "Gas is better known, and better advertised than electricity; it is not surprising that it should be increasingly employed as a labour-saving agent." But its kindliness is of only momentary duration. It goes on to say: "The comparisons we have mentioned disclose a little uneasiness. This particular comparison shows inferentially that relative to gas the use of electricity is tending to increase." Instead of "uneasiness," it seems to us that the comparisons show elation. But the writer in our contemporary ought to occupy a much higher position. He believes in himself as a prophet. He asserts (it is necessary and prudent in these matters to be a bit guarded) that "for many years the use of gas will continue, and will also continue to increase. But it is fighting a losing battle. How long that battle will be depends largely on the electrical industry. But the result is certain; and the gas interests know that as well as we do." We need not comment on such nonsense. If ever what is hinted at happens, the "Electrician" will have to mourn the death of one of the members of its own family. While writing on this subject, it is noticed that a correspondent of the "Electrical Review"—"R.B.D." says: "I am convinced that if the electrical supply authorities had one-half the push and enterprise shown by the gas people, there would be a considerable advancement in the electrical trade in this country."

Forthcoming Conference on Illumination.—A conference on Illuminating Engineering has been arranged to take place at the British Empire Exhibition on the afternoon of Aug. 12 (2.30 to 5.30 p.m.). Among other items, a report of the proceedings at the meeting of the International Illumination Commission and the First International Conference on Industrial Hygiene, recently held in Geneva, will be presented, and developments in connection with the lighting of schools and factories will be discussed. Other subjects include "Public Lighting" and the "Lighting of Exhibitions." A paper entitled "Illumination of Highways from the Motorist's Point of View" will be read by Mr. Edward H. Fryer (Head of the Road Department of the Automobile Association); and Mr. Haydn T. Harrison and Mr. G. L. Jennings (Brentford Gas Company) will deal with some features of the lighting of the Exhibition. Further particulars and tickets for the conference, which, it may be remarked, will be open to all interested in the subject of illumination, will be obtainable in due course from the Hon. Secretary of the Illuminating Engineering Society (Mr. L. Gaster, No. 32, Victoria Street, S.W. 1).

INTERNATIONAL COMMISSION ON ILLUMINATION.

Meeting at Geneva.

[FROM OUR SPECIAL CORRESPONDENT.]

What was designated on the programme as the Sixth Session of the International Commission on Illumination opened promptly at 9.30 a.m. on Tuesday, July 21, at Geneva, under the presidency of Dr. E. P. HYDE, of the United States of America, who is well known as an outstanding investigator of the subjects upon which the Commission are engaged.

All the other officers were present to support Dr. Hyde—namely, Prof. Th. Vautier (Hon. President); Mr. C. C. Paterson (Hon. Secretary and Treasurer); Mr. J. W. T. Walsh (Secretary General); M. A. Filiol (President of the Swiss National Committee), M. F. Largiader (Secretary to that Committee), and Col. Kenelm Edgcumbe (Vice-President). The complete list of representatives who signed the attendance register is as follows:

France.—M. P. Bossu (Paris), Prof. Th. Vautier (Lyons), M. Ch. Fabry (Paris), M. P. Fleury (Paris), M. Jonaust (Paris), M. Blondin (Paris), and M. Maisonneuve (Paris).

Great Britain.—Mr. H. Buckley (Teddington), Mr. W. T. Dunn (London), Col. Kenelm Edgcumbe (London), Mr. L. Gaster (London), Dr. J. Kerr (London), Mr. C. C. Paterson (London), Mr. J. W. T. Walsh (Teddington), Mr. Robert Watson (Doncaster), and Mr. J. Trezise (London).

Italy.—Sig. M. Bohm (Milan) and Sig. G. Semenza (Milan).

Japan.—Mr. T. Yamamoto (Tokyo).

Switzerland.—M. A. Filiol (Geneva), Prof. J. Landry (Geneva), Prof. P. Joye (Zurich), M. F. Largiader (Zurich), M. E. Payot (Geneva), Dr. K. Sulzberger, M. F. Tobler, M. W. Trub (Zurich), M. H. Wachter, M. H. F. Zangger (Zurich), and M. F. Fulpins (Geneva).

United States of America.—Mr. E. C. Crittenden, Dr. E. P. Hyde, Mr. J. W. Lieb (New York), Mr. C. O. Mailloux (New York), Mr. L. B. Marks, Mr. G. S. Merrill, Mr. A. L. Powell (Paris), and Dr. C. H. Sharp.

Poland.—M. Drenowski.

I may here explain, with reference to the assembly being denominated the Sixth Session, that the original body was formed at the Paris International Exhibition of 1900; Prof. Th. Vautier being the founder. Its name at first was the Commission Internationale de Photométrie. In 1910 it received its present title, as above. The first three sessions were held at Zurich, the fourth in 1913 at Berlin, and the fifth at Paris in 1921.

The President, in opening the proceedings (which were held in the Palais Eynard, kindly placed at the disposal of the Commission by the authorities of the University of Geneva), said that, although three years ago the Commission had decided that the sixth session should be held in the United States, it had unfortunately been found impracticable to adhere to this intention. After consideration by the Executive Committee, the town of Geneva had been chosen as being one of the most central on the Continent of Europe. The Swiss National Committee had volunteered to perform in one year what the members in the United States felt required several years to complete—the organization of all the numerous details of an international meeting. The Commission therefore owed a deep debt of gratitude for the invaluable services rendered by the Swiss National Committee and its able President, M. Filiol. Thanks were also due to Mr. Albert Thomas, the distinguished Director of the International Labour Bureau of the League of Nations, for the co-operation and the assistance which had so kindly been given by him. Dr. Hyde welcomed to the session M. Stoessel, President of the Council of the Town of Geneva (corresponding to our Lord Mayor of London).

M. Stoessel conveyed in a few cordial words a hearty welcome on behalf of the Town Council and inhabitants of Geneva. Representatives of various institutions from all parts of the world had assembled in order to discuss questions of great importance not only to themselves, but to the whole universe. He felt sure that the conference had before it objects of the greatest utility, and that it would endeavour to solve the problems by means of the purest, highest, and most neutral methods. The scientific problems which confronted them were of a highly technical nature, which he as a layman was not entirely competent to appreciate. The town and canton of Geneva felt honoured by the presence of the delegates, and hoped that they would carry away with them pleasant memories of their stay.

The President stated that they all regretted the unavoidable absence of Mr. Albert Thomas, but he had sent Dr. Carrozzi to represent him, and to convey his felicitations and good wishes for the entire success of the conference.

Dr. Carrozzi, speaking particularly on behalf of the Health Section of the International Labour Office, which he represented, said that through the work which had been undertaken in Paris recently, and through the co-operation of Mr. Gaster, it had been possible to issue a technical pamphlet dealing with certain aspects of the application of electricity. This question raised not only physical considerations, but also aspects of a physiological and medical character, which were of particular interest to his sec-

tion. He hoped that the practical results would be attained in the domain of industry in regard to questions of lighting, and was of opinion that knowledge was ripe for standardization, so that operatives might have good illumination, in order that their health or their eyesight would not be injured, It was only, in fact, with the collaboration of such Commissions as the present one that desirable results would be obtained.

M. Filiol then spoke. Having thanked the President for his remarks with reference to the Swiss National Committee, he extended a cordial welcome to all the delegates present. The Committee were very glad that Geneva had been honoured by its selection as the place of meeting for the sixth gathering of the International Commission on Illumination; and he hoped that it would contribute materially to the success of their labours. As regards the question of lighting, he thought that Switzerland had more to receive than to give. Nevertheless, the Swiss people were desirous of learning everything possible in connection with the progress and technique of lighting. The origin of electric lighting at Geneva dated from 1887; and the power station that serves the canton provided for about half-a-million lamps, or 3'5 lamps per head of the population affected. He thought, therefore, that possibly they had reached the limit of lighting, unless new methods were discovered which would contribute to a wider diffusion and further progress in their sphere. He sincerely thanked the authorities of the town of Geneva, the International Labour Office, and the Secretariat of the League of Nations for the interest shown, and for the help rendered, during the organization of the Congress. He regretted that Prof. Guye, through indifferent health, was unable to be present.

Prof. Vautier was the next speaker, and in the course of his remarks he recalled the fact that it was not the first meeting of the Commission in the country of Switzerland. The first three conferences had been held at Zurich. The formation of the International Commission on Illumination had been facilitated by the excellent work of the President, Dr. E. P. Hyde. He considered that much good would result if the National Committee of each of the countries represented on the Commission would prepare and issue a summary of the results of each congress, and if they would then communicate them to each technical body associated with the National Committees. He also hoped that each Committee would do all in its power to have the results of the congresses embodied in the legislation of its country.

The President then referred in sympathetic terms to the losses the Commission had sustained since its last meeting three years ago, owing to the regretted deaths of Dr. Laporte, Dr. Violle, and Dr. Louis Bell. Their loss was irreparable, and their names would never be forgotten in the history of illumination. Continuing, he said that since that meeting a National Committee had been organized in the Union of South Africa, and that in Belgium a National Committee was in course of formation. He welcomed Dr. Yamamoto from Tokyo, and other gentlemen who were present as observers. The time was soon coming, he hoped, when peace would reign everywhere, when all the peoples of the earth would co-operate in the pursuit of knowledge, and together enjoy the benefits of its application. There was plenty of room for unlimited research in the highly complex problems of lighting. Perhaps some day an exhibition would be organized to show the results of international labour in the domain of illumination.

Mr. Paterson (as Hon. Secretary and Treasurer) then presented the accounts for the previous three years. His task, he said, was a brief and happy one, and he congratulated the Commission on having such an exceedingly favourable balance-sheet. He formally moved the adoption of the report, and remarked that he would, at the second plenary session, have pleasure in offering certain suggestions to the Commission for the reduction of the rate of subscriptions from each National Committee for the ensuing three years. On the President calling for nominations for the Editing Committee, Mr. Paterson, on behalf of the Executive Committee, proposed, and it was unanimously agreed, that Messrs. Mailloux, Bossu, and Largiader be the Editing Committee.

The President then indicated how the Executive Committee had decided to deal with the papers and discussions during proceedings of the Commission. Each communication would be presented in brief abstract form. Those desiring to speak in the discussion would be allowed a maximum of only three minutes. The language would be either French or English; and two gentlemen from the League of Nations would act as translators. He mentioned that Col. Edgcumbe, of London, would preside at the session that afternoon. M. Rouland, of Paris, would be asked to preside on Wednesday morning; but in his possible absence the chair would be taken by M. Fabry. Prof. Semenza would preside on Thursday morning. As far as possible, the papers would be grouped and a common discussion would follow.

This concluded the general business at the opening of the proceedings.

Gas Light and Coke Company's Dividend.—We learn from the Secretary (Mr. W. L. Galbraith) that the Directors of the Gas Light and Coke Company have declared dividends for the half-year ended June 30 at the rates per annum of 4 p.ct. on the 4 p.ct. consolidated preference stock, 3½ p.ct. on the 3½ p.ct. maximum stock, and £5 6s. 8d. p.ct. on the ordinary stock. A year ago, the dividend on the ordinary stock was at the rate of £5 4s. p.ct. per annum.

CARBONIZATION.

A Résumé and Criticism of "A Study of the Destructive Distillation of Coal"—Three Cantor Lectures by E. V. Evans.

By Dr. W. B. DAVIDSON.

These lectures, delivered four months ago, are of so great importance as to warrant a renewal of study and criticism. It is the main object of the present article to endeavour to set out briefly and clearly the main accomplishments of the research work on carbonization described in these admirable lectures.

The author begins by deploring the fact that he must necessarily confine himself to the working of horizontal retorts. There are undoubtedly considerable differences in the reaction mechanism of vertical as compared with horizontal retorts; and one cannot help feeling that there is a lack of completeness when the popular vertical retort is omitted from consideration.

THERMAL EFFICIENCY IN GAS MANUFACTURE.

It is quite true that in chemical industry the chief desideratum is yield—generally called efficiency, or percentage efficiency. An acid plant, for example, is judged very largely by its "over-all efficiency," meaning thereby the net percentage yield, calculated on what is theoretically possible. Judged in this way, the ordinary well-designed gas-works making coal gas has the high thermal efficiency of about 85 p.ct., made up as follows: Gas, 24 p.ct.; tar, 6 p.ct.; coke, 55 p.ct.; the balance being fuel consumption 11 p.ct., and unavoidable losses in destructive distillation chiefly due to the formation of water (liquor) 4 p.ct.

This question of thermal efficiency of gas manufacture is a vexed one. On principle one man has no use for coke (I need not mention names); while others look upon coke as almost equal in importance to gas, and are keenly anxious about the tar and ammonia markets. Strictly speaking, as a gas-making proposition, the thermal efficiency on the above figures is 24 p.ct., allowing nothing for bye-products (which might, of course, some day be unsaleable), as against about 50 p.ct. for water gas and 70 p.ct. for producer gas, in round figures. Taking what is probably the most sensible view, the thermal efficiency is obtained by considering what percentage yield the gas represents of the balance left after deducting the value of the coke and tar. In this case, therefore, we get as percentage yield or efficiency: $24 \times 100 \div 39 = 61\frac{1}{2}$. Under average conditions, or with high fuel consumption, it may be as low as 45 p.ct.

Here it might be remarked that, while everyone must agree with the author that research and large-scale experiment tend to "bring the process of coal distillation nearer to a true chemical process," it remains, as he says, our "major duty to manufacture gas." The distillation process is by no means ideal. There are the obvious inherent and ineradicable faults, that the plant, labour, and maintenance are very costly, and that the bye-products far outweigh the gas in thermal importance. True, the coke is a source of potential therms, but only when it is gasified; it cannot be carbonized. The tar—which, however, does not amount to much—can be to some extent inefficiently "cracked."

HIGH AND LOW TEMPERATURE CARBONIZATION.

A comparison is made between high and low temperature carbonization. With the same coal the laboratory tests were as follows, the results being expressed in therms per ton of coal:

—	Gas.	Tar.	Coke, Less Volatile Matter.	Total.	Loss.
High t°	72	17	(196)	199	12
Low t°	35	26	(194)	223	16

These figures, of course, take no account of the fuel consumption in heating the retort, which is naturally very much higher in the former case. The losses—12 and 16 therms—are respectively 4 and 5½ p.ct., and, considering possible experimental errors in figures obtained thus by difference, may be regarded as equal. At first sight it seems surprising that the high-temperature process shows no greater loss than the low—if anything, slightly less. Two or three things, however, must be borne in mind in this connection. At low temperature the first products of decomposition of the coal are carbon dioxide and steam, which are drawn off without undergoing any reaction with the coke; whereas at high temperature these products take part in secondary water-gas reactions with the coke on the one hand and carbon monoxide on the other—these reactions requiring the supply of external heat. Again, whereas at high temperatures there is a considerable amount of degradation of the hydrocarbon gases to hydrogen and carbon, the carbon value, while lost to the gas, is not lost to the balance-sheet, for it is included in the tar. At very high temperatures the free carbon in tar often exceeds 30 p.ct., and if excluded would reduce the therm value of the tar by some 4 or 5 units. Tar, however, is rarely appraised by its therm value, and, as a matter of fact, horizontal retort tar with a comparatively high free-carbon content is to be preferred for road making to vertical retort tar with a much lower percentage of free carbon.

After all, I think the thermal balances for high and low temperature carbonization are pretty much what one might

expect, and in any case have little bearing on the respective merits of the two processes, which have widely different aims. The high-temperature process has professedly for its main object the greatest possible yield of gaseous therms consistent with reasonably low fuel consumption, labour charges, and maintenance costs. There must be an optimum economical balance in the scheme, and we believe that in some works this was reached ten or twelve years ago—that is, as far as pure carbonization is concerned.

With low temperature, on the other hand, the main object in view is, in many cases, smokeless fuel worthy of a much better price than raw coal for the household. In my own house, I have burnt gas coke instead of coal for many years, and experience no trouble, even with Durham coke. I am quite satisfied if the coke is the right size and reasonably low in ash. Having overcome difficulties of ignition and stoking, I hardly think I should be willing to pay much more for coalite or other low-temperature coke than I do for gas coke. Still, there is no gainsaying the advantages of a properly-sized, ready-burning coke; and if the supply of this article is a commercial success, no one will be more pleased than the writer.

Other low-temperature processes rely almost entirely on the tar oil and motor spirit values of the products, counting only on therm value for the coke and gas produced. One process is said to give practically no gas, but a high yield of tar oils and motor spirit. Now, motor spirit has at the present time a value per therm probably three or four times as much as that of gas in the gas-works holder, and the discrepancy tends to increase. As a gallon of motor spirit has a calorific value of 1½ therms, 16 gallons per ton, at three times the net price per therm, are the equivalent in money value to 72 gas therms. Not that any low-temperature process that I know of succeeds in getting this yield of spirit, which also with the best process costs a considerable amount to recover, but the figure is put forward to illustrate the widely different aims of the two schemes, which ought to be judged, not by their respective thermal efficiencies, but by their economic or commercial success.

No gas maker in his senses would advocate low-temperature destructive distillation unless on account of special features which are quite foreign to any question of a thermal balance. When one considers that gas coal delivered at the works costs only 1d. per therm, and that the gas in the holder costs 3d. to 4d., while fuel and thermal losses account for only ½d., one realizes that there are heavy costs (plant, labour, running costs, maintenance) that make up the difference. It is not unreasonable to assume that some day a low-temperature process will arise where the capital charges, labour, and maintenance per ton of coal, will be so low as to make it a really safe commercial proposition. Caracristi in the process adopted by Henry Ford (of motor-car fame) has shown that carbonization at 600°C. is complete in five minutes. The speed of distillation or output, therefore, when small coal is heated in a shallow layer externally, or in bulk by hot gases (such as superheated steam) internally can be remarkably high. It is well known that most remarkable yields of tar (up to 80 gallons per ton from good cannel) can be obtained, if special means are taken to prevent secondary decomposition of the primary tar first formed.

From the point of view of conservation of energy of the coal substance, neither high nor low temperature carbonization can make any wonderful claims, seeing that only a small proportion of the heating value of the solid coal is converted into the more accessible gaseous or liquid form—the great bulk still remaining in the solid state. In other words, gas and coal tar manufacture is dependent on the 30 p.ct. or so of volatile matter contained in the coal; the rest is "fixed carbon" capable of gasification by steam and/or air, but not amenable to distillation. Although, therefore, the expansion of carbonization is severely restricted, retort-house economy is a matter of the highest importance. The author gives the following essential requirements: (1) Uniform distribution of heat; (2) cool mouthpieces; (3) all retorts in a setting carbonizing at the same rate; (4) even charges of suitable weight.

Great importance is attached by the author to the maintenance of the retort and its fittings, and all that appertains to it. A small plant carbonizing 3 tons of coal per day was used to ascertain the effect of different kinds of leaks upon the volume, calorific value, and composition of the gas produced, using a typical Durham gas coal. To begin with, the normal results are given representing those obtainable with 10 cwt. charges in 10 hours, in a 20 ft. retort, with a combustion chamber temperature of 1320° C., the vacuum maintained being 3-10ths water gauge. The gaseous thermal yield thus normally obtained was 73·5, which might be considered a fairly high figure for an average coal. Judging by the analysis given on p. 552 of the "JOURNAL" for March 5 (volatile matter, 33·5; ash, 5·13; moisture, 1·42 p.ct.; calorific value, 14,400), the coal would be considered exceptionally good by most gas engineers, especially when the calorific value on a moisture and ash-free basis is found to be as high as 15,470. This leads one to say one feels inclined to deprecate the use in research work, on small or large scale, of coals that cannot be said to be ordinary or average as delivered to, or used by, the works. It has unfortunately been common practice, and is calculated to create a wrong impression of the possibilities of a process when carried out on a large scale on ordinary materials. It would be interesting to know how many works, for example, can claim yields of 80 or more therms per ton obtainable with steaming *ad lib.* Very few, we believe. The kind of coal plays an important part, and the best coal is not always obtainable.

(*To be concluded.*)

BRITISH EMPIRE EXHIBITION NOTES.

THE GAS EXHIBIT.

Last week among the notable visits to the Gas Exhibit was that by the Gas Light and Coke Company's Co-Partnership Committee. The Governor (Mr. D. Milne Watson) and principal officials accompanied the party, which numbered about forty. Much satisfaction was expressed by the visitors at all they saw.

SOME STATISTICS.

In the course of some remarks which he made recently at a meeting of the Institution of Municipal and County Engineers, Sir E. O. Williams (the Consulting Engineer of the Exhibition) said that the use of concrete for the principal buildings secured economy, trustworthiness, speedy construction, and the fulfilment of architectural requirements. Referring to the cost of the Palaces of Engineering and Industry, he stated that, per square foot of floor area, this was only 25 p.ct. more than that of the White City Exhibition buildings, although those buildings were erected when materials were but half as expensive as is the case to-day. Altogether 200,000 tons of concrete has been placed at Wembley without a single failure.

There are 6 miles of large gas-mains to augment the normal Wembley supply, and more than 7 miles of main pipes have been laid in the grounds.

CARDIFF OF TO-DAY.

Last week Cardiff was in residence in the Civic Hall of the Exhibition, when the Development Committee of the Cardiff City Council were able to put forward a strong case for the choice of their port and district for manufacturing and trading purposes. Cardiff has municipal water and electricity supplies; but, as readers are aware, the important task of providing the city with a gas supply is efficiently performed by a Company, which, indeed, constitutes one of the largest of the local industries—furnishing gas to a surrounding area of approximately 68 square miles. There are approximately 270 miles of mains throughout the area of supply. In addition, they are of very material assistance to local manufacturing firms by providing a supply of coke made from a blend of the finest gas-making Yorkshire and Welsh coals, and specially graded into four sizes—large, broken, nuts, and beans. In no way less progressive than the city itself is the undertaking which is responsible for one of its most important commodities—gas.

THE "GRIPOLY" CONVEYOR.

Among the exhibits in the Civic Hall was a display by Messrs. Lewis and Tylor, Ltd., of the Gripoly Mills, Cardiff. They make a portable conveyor for coal, coke, &c., which can turn in its own length without any lifting, and is adjustable by one man or boy. It is rigid in all positions and self-locking at all elevations. All controls are at one point, and it is fitted with self-adjusting driving gear. A table of actual performances, under operating conditions, at a London gas-works, shows that 9 tons of coke breeze were loaded into tip carts in 30 minutes, with two men shovelling. Three men shovelling loaded into a lorry in 20 minutes 4 tons of washed clinker. It is impossible to overload the conveyor by any ordinary means, as normally the number of men who can be accommodated feeding it cannot keep up with its full capacity. The firm are also makers of "Gripoly" solid woven belting, of which they are the patentees. This is manufactured from camel-hair yarns, combined with a small percentage of cotton, and woven by a special process so as to ensure the greatest possible tensile strength and evenly consistent wear during the life of the belt.

"DUPLEX MONO" GAS ANALYZING MACHINE.

Among the many exhibits in the Palace of Engineering which are attracting attention to a notable degree, and the usefulness of which are generally recognized, is the "Duplex Mono" automatic gas-analyzing recorder for CO_2 as well as combustible gas. This is shown on the stand of Messrs. James Gordon & Co., Ltd., of Windsor House, Kingsway, London, W.C. A CO_2 recorder in which any trouble with working parts, time lag, choking and corroding of the gas lines, &c., is eliminated, is rendered doubly valuable when there is combined with it the means of showing also on the same chart the percentage of combustible gases. It is pointed out by Messrs. Gordon & Co. that recording CO_2 alone, and attempting to control furnaces from these records, has never under any conditions given results even approaching the possibilities of economical combustion; for it is quite possible to have large quantities of combustible gases present with low percentages of CO_2, as well as with high percentages. For example, if the fire in one part of the furnace is very thick and dirty, combustible gases would be generated in that part and escape unburned, because not enough air would be going through. If at the same time there were an air hole in another part, air would rush through unused. In these circumstances combustible gases would be found present, while the CO_2 recorder would show excess air by a low reading. Cracks or leaks in the boiler setting

or leaky clean-out doors will also give a low CO_2 reading, and the adjustment of draught indicated by the low CO_2 would only increase the loss by producing a greater percentage of combustible gases. It is only by continuously recording the percentage of CO_2 as an indicator of excess air, and simultaneously detecting and recording the presence of combustible gases (CO, CH_4, and H_2) immediately they are present, that effective combustion control can be established. The firm have charts which show CO_2 curves alone, and apparently indicate good combustion, and other "Duplex Mono" charts taken simultaneously from the same boilers which prove that heavy losses have in reality been taking place. This instrument automatically makes and records thirty gas analyses each hour, recording CO_2 and combustible gases alternately—thus continually indicating to what degree economical combustion is being attained, and thereby securing the most efficient working.

The gas is taken from the place where the most characteristic sample can be obtained through a ½-in. sampling tube, and then through a special filter which removes all suspended matter and moisture, thus obviating the possibility of the piping to the instrument choking, or water-traps forming. The gas next passes to the instrument through a copper pipe ⅜ in. in diameter. This sample is driven through the instrument by a mercury pump of special design, which is an integral part of the apparatus, and is operated by either water or compressed air; the pressure required being not less than 8 lbs. The gas is drawn from the flue by the suction stroke of the mercury pump into a volumeter, which on the pressure stroke accurately measures the sample, after which it is forced through an absorption tank containing caustic potash, where the CO_2 is absorbed. The residue passes into a measuring bell floating in glycerine, which, as the gas goes into it, rises and turns a balanced wheel, which, through a pin, actuates a pen wheel. This, in turn, operates the pen, and causes it to draw a line on the chart indicating the percentage of CO_2. When the mercury pump has completed its pressure stroke, its suction stroke commences, and the measuring bell is put in communication with the atmosphere, and ejects by its own weight the residual gases, whereby the pen returns to zero. On the next stroke of the mercury pump, the gas is drawn in as before, but diverted by a directing valve (also operated by the water pressure) after being measured in the volumeter, and passed through a small electric furnace where the combustible gases are burnt to CO_2 and water vapour, in the presence of copper oxide, which supplies any required oxygen, and also acts as a catalytic agent. From this furnace, the gas passes through the absorption chamber, where the water vapour and the total CO_2 (the original CO_2 in the flue gas and the CO_2 formed by the complete combustion in the furnace) is absorbed, the residue measured in the measuring bell, and the total percentage of CO_2 and combustible gases registered on the chart.

Owing to the special design of the gas filter, the pipes, it is said, cannot choke, and in consequence the maintenance is negligible. The gasholder being cooled by a coil in which the operating water circulates, and the rest of the tubes being kept at the same temperature by the mercury, which is also in constant contact with the water, the gas in the volumeter before analysis, and in the measuring bell after analysis, is always at the same temperature; thus the measurements are extremely accurate. The instrument is supplied with a two months' chart, self-filling pen, and a special filling device for replenishing the caustic potash in the absorption tank, as well as a filter for filtering the operating water before admission to the instrument. A special arrangement is made for accessibility to all the parts without interfering with the operation of the instrument. Everything is of highest-grade workmanship and construction, and is designed for operating under ordinary conditions in the boiler house. The recorder is supplied in a dust-proof metal case, with glass front, so that it is well protected.

The instrument has been termed a revolution in automatic flue-gas analysis, and we feel sure it will be agreed that sufficient has been said here to demonstrate the important part which it has been designed to fill.

"The Design and Working of Ammonia Stills."—This is the title of a new publication of Messrs. Ernest Benn Ltd., No. 8, Bouverie Street, E.C. 4. Written by Mr. P. Parrish, A.I.C., Manager of the Chemical Works of the South Metropolitan Gas Company, the book deals in a practical way with the design of stills, preheaters, condensers, dephlegmators, and coolers, with special reference to economy of steam. The work covers also the manufacture of concentrated ammonia, carbonate of ammonia, caustic ammonia, and ammonia-soda. The price of the volume is 40s. net.

Tar the Bountiful.—According to a Press Association announcement, Mr. Thomas King has succeeded in producing from a tar basis a permanent solid paint, which is claimed to be absolutely acid and alkali proof, capable of withstanding without detriment any temperature between zero and 500° Fahr., able to be rendered quite non-inflammable, and cheaper to produce than any other paint now in use. A binding composition for road making is another product, while a third is a colourless liquid with which any kind of inflammable material can be treated, rendering it absolutely non-inflammable. This constitutes a useful list of commodities.

ACTIVATED CARBON AND SILICA GEL.

Benzole Recovery in France.

[From a Paper read by M. Edouard Urbain at the Centenary Congress of the Société Technique.]

That the world is faced by a very serious problem in the enormous increase in the consumption of fuel oils, was stressed by M. Urbain in his introduction to this paper, which reviewed the work carried out by himself and others on the development of the charcoal and silica gel processes for benzole recovery. Among the most fruitful sources of carburants are town gas, coke-oven gas, &c., which contain hydrocarbons easily liquefiable at ordinary temperatures. We give an extended translation of the greater part of the contribution, as, though the processes are hardly beyond their infancy, research in the subject is of great interest to the gas industry.

The matter was taken up and studied very thoroughly at the experimental station of the Société du Gaz de Paris by M. Sainte-Claire Deville, who threw light upon, among other things, the influence on the benzole content of different factors in carbonization and condensation, and which led him, in the course of his researches, to devise an excellent method for estimating the benzole content of gas. This work was originally carried out with the view of benzolizing gas, for it must not be forgotten that a comparatively short time ago benzole was actually introduced in order to satisfy the requirements of a lighting standard; and I should err if at this point I did not congratulate your industry on the considerable progress which has been made of recent years.

The question of debenzolizing town gas only arose during the war, owing to the shortage of basic materials for the manufacture of explosives; and consequent upon the legislation of November, 1915, plant for the purpose was installed in all important gas-works. This law was rendered necessary by the fact that the scrubbed gas no longer satisfied the statutory obligations of the undertakers; but it was only emergency legislation dictated by the demands of the Défense Nationale, and which could be abrogated by a Departmental order. Public opinion, however, moved after the war towards the more efficient use of solid fuels, and the augmentation of our supply of fuel oil; and, as a result, the modified and more complete law of July, 1923, was passed. This law specifies that in every new or modified Order, the calorific power of town gas shall not be more than 4500 calories per cub.m., nor less than 3500 calories [505 to 393 B.Th.U. per c.ft.], and forces every gas or coke-oven undertaking possessing public utility powers to extract from the gas distributed all chemical products or carburants which are necessary to industry or to national defence work.

There could be no question, at the time this law was framed, of making its provisions more definite, for the technical experts on the Government Committees found this beyond their power in the absence of debenzolizing processes which would meet the needs of the gas-works of small and medium size, which, of course, are very much in the majority. The only processes for benzole recovery industrially applicable at the time were those based on the employment of liquid solvents; but, since then, the outlook has been greatly modified by the use of solid adsorbents.

[The author then proceeded to make a brief review of the research work carried out on liquid solvents; but we propose to pass direct to his treatment of activated carbon and silica gel.]

ACTIVATED CARBON.

During the war a wide use was made of special charcoals for purposes of protection against poison gas; and gradually more and more active material was produced. This naturally led one to consider the use of this substance for the separation of easily liquefied gases. The firm of Bayer worked on the subject in Germany, and patented a process (based on the employment of a special activated carbon of which the details of manufacture have been kept secret) for the recovery of hydrocarbon gases. In America the application of charcoal on a very big scale seems to have been retarded by the fact that for a long time the only known material suitable for industrial use was manufactured from the shell of cocoanuts. Processes of selective oxidation, as outlined by Chaney, might result (as far as one can judge from the rather vague information which has been published) in the "activation" of various carbonaceous materials, and might obviate the above-mentioned difficulty. But the cost of such prepared material rapidly increases in proportion to its activity; and this consideration seems to have led the Americans to recommend something less "active" for industrial purposes. In my opinion, this tendency is altogether wrong, for the highest possible adsorbent power should be the primary consideration. Be that as it may, a process offering such obvious advantages must take hold in a country like America, where recovery of the light oils from natural gas alone opens a wide field of application. According to recent information, there actually exist in the United States nine works treating about 2 million cub.m. of natural gas with activated carbon, and twelve other plants are in the course of construction for the treatment of 5 million cub.m.

MM. Rouland and Laurain, in the course of my research, asked me about a year ago to continue it with their undertaking; and for this I am deeply gratified. My work has been under the direction of M. Laedlein, the Technical Director, who put at my service M. Sabrou, the Engineer of the experimental station at La Villette.

At the same time I was able, thanks to the kindness of M. Jenny, the Light and Distribution Engineer at Grenoble, who was among the first to take a practical interest in the matter, to try on a practical scale in his benzole plant carbon which I have had prepared, and to examine the performance of special apparatus which I have devised to increase the efficiency of the process.

The mechanism of adsorption is still completely unknown to us, and to relate the hypotheses which have been put forward would lead me too far; but if we are still unaware of the inner working of the phenomenon, we already know much of the properties of activated carbon. It is the knowledge of these properties which has been my guide in determining the conditions which go farthest towards the efficiency of adsorption, and easy and cheap recovery of the products. 1.—Adsorption always takes place with liberation of heat; and so, when one comes to recover the adsorbed products, one must supply, over and above the heat necessary for their vaporization, a quantity of heat at least equal to that liberated by the adsorption. Further, steps must be taken to prevent the production of heat interfering with the actual occlusion process. 2.—Activated carbon exercises a selective action on the various gases or vapours. Take, for example, the case of illuminating gas—suppose one passes it through three columns of adsorbent in series, until these are saturated; it is found that the constituents adsorbed in the last column are of lower density than those in the others. One has therefore a simple means of completely eliminating the heavy hydrocarbons, and particularly naphthalene.

These important data I bore in mind throughout my study of the five principal matters for research, agreed as such by the experts with whom I have discussed the process. These cardinal points for research are:

1. Steam requirements.
2. Quality of crude benzole obtained.
3. Loss of gas pressure in the plant.
4. Facility of operation.
5. Life of the adsorption medium.

Before examining these five questions in detail, I must point out that the results I shall give you have all been taken from, or verified by, experts who have been sent to the Grenoble Works, which debenzolizes the whole of its make of gas, amounting to 7500 to 15,000 cub.m. a day—in particular by Dr. Davidson, Consulting Chemical Engineer, of Newcastle-on-Tyne, and Mr. Hoffert, of the National Benzole Association and Leeds University. The results also comprise certain conclusions arrived at by M. Laedlein in the course of his work at La Villette.

Steam Consumption.

It would appear that many are of opinion that the removal of the benzole from the adsorption medium necessitates a considerable consumption of steam; and in this regard figures are cited in the neighbourhood of 8 kg. per kg. of benzole. It is true to state, as has been pointed out earlier, that in this process one must furnish the counterpart of the heat liberated by the adsorption; on the contrary, however, the specific heat of activated charcoal is much below that of washing oils, and in consequence it becomes saturated at a much higher rate. The consumption of steam is therefore comparatively low, as figures will prove to you. Certain high figures which have been published are due to the extremely primitive method to which recourse has been had for removing the benzole, and which consisted simply of bringing superheated steam into direct contact with the charcoal. As it is naturally impossible to saturate the medium with water without lowering its adsorptive capacity, it follows that only the "superheat" of the steam could be employed; and so the efficiency of utilization was extremely low, for the superheat, at the temperature of working, only represents about one-seventh of the total available heat in the steam.

One of my first objects was to improve the working by externally heating the adsorptive material and the apparatus, which permits the putting to useful purpose of the latent heat of the steam without wetting the charcoal. Thus the direct steam is only introduced into the plant when the latter is at a temperature of about 100° C.; and the quantity required to remove the benzole is very much reduced. At Grenoble, with plant of a capacity of 1200 litres, the consumption of direct steam varies between 115 and 140 kg. per run, according to the weight of benzole occluded, the superheat of the steam, and the amount of indirect steam used in the coil. The indirect steam varies between 20 and 50 kg. per run.

Table 1.

Experiment No.	Benzole Recovered. Litres.	Direct Steam. Pressure 0·4 Kg.		Indirect Steam. Not Superheated		Total Steam. Kg.	Steam per Litre Benzole. Kg.
		Kg.	°C.	Kg.	Pressure. Kg.		
1	69·7	119	250	49	4	168	2·4
2	64·5	137	210	21	4	158	2·3
3	87·6	115	270	30	4	145	1·7
4	89·5	119	270	35	4·5	154	1·7

Table 1 gives the results of four tests, and Table 2 running details of test 4. It is seen that a kilogramme of benzole is recovered for a total steam consumption of about 3 kg. In this test, No. 4, the direct steam was circulated for about 35 minutes, and the temperature in the middle of the charcoal bed reached 120° at the end of the run. As soon as the direct steaming is stopped, one can without disadvantage recommence circulation of the gas; the adsorptive property of the charcoal even at a temperature of 100° being such that it entirely removes the benzole. In the paper the author gave a graph which showed the cooling of the charcoal plotted against the volume of gas passed; and it reveals that during a quarter of the adsorption period the temperature remains above 40° C. The special interest of this lies in the fact that it demonstrates the applicability of the charcoal process in hot climates in which the ordinary processes are practically impossible. Cooling can with advantage be hastened by circulating cold water in a coil running through the charcoal—an arrangement which was adopted at Grenoble on my suggestion, and it is particularly useful for the recovery of hydrocarbons and other substances of low boiling-point, for it prevents the attainment of a harmful temperature during the adsorptive process.

Table 2.

Minutes.	Water Vapour Condensed. (A.)	Benzole Condensed. (B.)	$\frac{A}{B}$
	Litres.	Litres.	P.Ct.
0	..	..	..
11	..	..	..
12	6·4	23·6	27·1
13	12·5	28·0	44·6
15	17·2	39·6	46·3
18	26·7	52 8	50·5
19	29·1	59·4	49·0
24	45·5	77·5	58·6
26	53·6	81·4	66·0
28	63·2	85·8	73 6
31	79·0	86·0	92·0
36	104 9	88·1	130·0
39	113 5	89·5	132·0
47	118·5	89·5	132·0

Benzole recovered . . . . . 89·5 litres, or 79·3 kg.
Volume of gas treated . . . . 2440 cub.m.

Quality of the Benzole.

As for the quality of the crude benzole recovered from the charcoal, I cannot do better than submit to you the comparative table compiled by Dr. Davidson, which gives all the characteristics of the benzole produced at the Grenoble Works, side by side with the specification of a good motor-spirit benzole. I should add that the Grenoble product, without any rectification, finds a ready sale as motor spirit, and gives excellent results.

Table 3.

—	From Activator.	Commercial. Rectified and Washed.
Density	0·881	0·870 — 0·885
Humidity	*Nil*	*Nil*
Colour	*Nil*	*Nil*
Acid test	Dark-brown precipitate	Light brown precipitate
Purity	Free of acid, soda, and H_2S	Do.
Freezing point	−10° C.	−13·9° C.
Sulphur	Total . . 0·35 p.ct. CS_2 . . 0·09 ,,	0·40 p.ct.
Evaporation in copper pan	No residue or gum	Do.
Distillation	100° . . 90·5 p.ct. 120° . . 94·5 ,, 125° . . 95·0 ,,*	100° . . 75 p.ct. 120° . . 90 ,, 125° . . 100 ,,

* The small fraction boiling above 125° C. contains practically no high-boiling hydrocarbons.

Pressure Loss.

The plant is generally situated in front of the station meter, and in consequence the loss of pressure becomes an important consideration, for in many works the original working pressure is limited by the seal possible in the purifiers. Very fine or powdered charcoal tends to choke the plant, and should therefore be avoided; and the author prefers to reduce the pressure as far as possible by employing a granular material, regular and with no tendency to conglomerate. A graph accompanying the paper shows (approximately) the resistance of an adsorber, of 1 sq. in. cross-section with a bed 1·1 metres deep, as a function of the volume of gas passing. At 7 cub.m. of gas per minute, the pressure thrown is about 40 mm. of water; and throughout the possible range the figure is fully admissible.

A Note on the Working.

Practice has proved beyond a doubt that the working of a charcoal adsorption plant is a very simple matter. The author would not even have mentioned this, were it not that one of the experts sent to Grenoble, who is now fully convinced of his error, arrived with the preconception that the control of temperatures, pressures, &c., in the plant was an extremely delicate task, almost requiring the permanent attendance of a chemist.

Life of the Agent.

Questions have been raised regarding the useful life of the active material, and experience already gained enables one to some extent to gauge the future. As far as the mechanical strength of the granular charcoal is concerned, the process produces no powdering or breaking-up, and more than a year's continuous service reveals no usage of the material. The latter is, in fact,

subjected to practically no strain, for in practice it is carried on trays of specially prepared carbon; and there can be no loss of charcoal during operation.

There remains only the possible diminution of its adsorptive capacity. In the case of the recovery of simple highly volatile substances such as acetone, ether, alcohol, &c., from a mixture with air, it has been proved that the regeneration of the charcoal after steaming is complete, and that even after prolonged use there is no perceptible diminution in its capacity. One cannot hope for absolutely the same result with town gas, for this is an extremely complex mixture of gases containing, even after purification, volatiles likely to be occluded together with the hydrocarbons one seeks to recover. Experiments at La Villette and Grenoble have shown that cyanogen compounds give no trouble, for they are carried off with the steam and found again in the condensate; in fact, the elimination of these products is a great advantage, as they are the cause of much corrosion elsewhere. Other nitrogen compounds are less easily steamed away; and the author has found small traces of them in charcoal which has treated many thousands of cubic metres of gas.

As for naphthalene, it is completely arrested in the plant; and a great part is found in the benzole, without in any way diminishing the value of the latter as a carburant. Periodical blowing with highly superheated steam will effectually dislodge any pockets of naphthalene which may form during a rush period of working. Certain high-boiling hydrocarbons, however, as well as the above-mentioned nitrogen compounds, are not easily driven off by such methods.

It is evident, therefore, that by seeking to recover all the condensible products in one piece of plant, there will be a gradual decrease in efficiency; but this stumbling-block is easily avoided if one bears in mind the fact that the very substances which are most readily absorbed by the carbon are those which may be selectively eliminated. It suffices to place a catch filter in front of the actual debenzolizing ones, using therein a special material which can from time to time be changed or regenerated. With this precaution, and with a carefully designed plant, it may be taken that the material in the benzole section will preserve for a very long time its adsorptive capacity.

SILICA GEL.

Although my own experience has convinced me of the superiority of activated carbon, I will conclude with a few remarks on silica gel, which has been the object of considerable research in the United States. The substance was first obtained by Graham, in 1861, by treating a solution of sodium silicate with hydrochloric acid. The result was a spongy body which on drying with sulphuric acid set into a hard vitreous mass of great porosity. In 1890, Van Bemmelen again took up the question, and discovered that the product when broken up into fragments like glass had the property of adsorbing water and vapours.

Unfortunately silica gel has certain serious defects from the industrial point of view. 1.—Its adsorptive power becomes relatively weak when the products it is sought to remove are very much diluted (which is most usually the case). Experiments with an American gel, on a mixture of dry air and benzene vapour, show that at 30 gr. of benzene per cub.m., 13·5 p.ct. is the saturation figure; at 135 gr. per cub.m., 40 p.ct.; and at 200 gr. per cub.m., 50 p.ct. Thus the material has only about 13 p.ct. capacity for the benzole content of a good town gas. 2.—Silica gel adsorbs water vapour in preference to hydrocarbons, which is a serious matter in view of the fact that all industrial gases, and particularly town gas, contain water vapour. It has been found that with coal gas containing 32 gr. of benzole and 15 gr. of water vapour per cub.m. silica gel can only adsorb about 8 p.ct. of its weight of benzole, and that if the gas continues to be passed through the plant, the benzole is eventually completely displaced by the water vapour—a point reached when the water adsorbed amounts to about 25 p.ct. of the weight of the gel. 3.—Its manufacture is very costly. Such are the defects of silica gel which have decided me to turn to activated carbon and to effect the manufacture of such a material to meet industrial requirements, and to study the apparatus best suited to its use.

I must remark here that the conclusions set forth in the extremely detailed communication on silica gel made last March to the Society of Chemical Industry by Prof. E. C. Williams [see "JOURNAL," Vol. 165, p. 708] are little in accordance with the results of my work. He admits, however, that activated carbon possesses the great superiority over gel of a high adsorptive capacity, even for diluted vapours, and of selectively adsorbing hydrocarbons in preference to water vapour. Further, his communication gives one to understand that the commercial value of gel adsorption processes cannot yet be gauged owing to the defects already pointed out and the complicated plant for circulation, recuperation, &c., requisite for such a finely-ground material. On the contrary, Prof. Williams ascribes to gel two advantages over activated carbon coal: It does not precipitate sulphur from the sulphuretted hydrogen, and it is possible to calcine it in an oxidizing atmosphere which permits the burning-off of high-boiling products which may have collected in its pores.

CONCLUSION.

Oil debenzolizing plants are only applicable to very big works, and even in such cases the employment of the active carbon processes will give results superior to those of the best oil plants, both as to the yield of benzole and in general working expenses. In medium-sized and even in the smallest works, debenzolization by such methods must come; and I hope that the practical results indicated in this communication will have convinced you.

TREATMENT OF EFFLUENT SPENT LIQUORS FROM THE DISTILLATION OF AMMONIACAL LIQUOR.—II.

(*Continued from p.* 325.)

The question arises, how far would it be practicable so to modify the condensing system as to improve the character of the general body of liquor run to storage and subsequently distilled for the recovery of ammonia. The problem is, perhaps, rather one for the chemist than for the gas engineer, as the recovery of by-products—tar and ammonia—is not the primary function of a gas-making plant; but, making use of the present example by way of illustration, the following alterations suggest themselves, the adoption of which should effect improvement in the character of the liquor distilled, if it be found practicable to modify conditions without undue disturbance of existing plant.

HORIZONTAL RETORT SYSTEM.

1. Decrease the temperature of the atmospherics in order to:
   (*a*) Increase the volume of relatively "good" liquor separating at this point.
   (*b*) Reduce the temperature of the tar washers and scrubbers, and thus favour fixation of ammonia and reduce, incidentally, the volume of water vapour condensed in the purifiers.
2. Admit air under pressure at the purifiers instead of at the exhausters (exit to condensers), in order to reduce the amount of thiocyanate and thiosulphate.*
3. Isolate, for separate treatment or sale, the condensed liquor from the purifiers.
4. Decrease the opportunities for contact of tar and liquor throughout the plant. Ammoniacal liquor is a good solvent for phenols and higher tar acids, and therefore is contaminated by contact with tar containing those constituents.

VERTICAL RETORT SYSTEM.

Remarks 2, 3, and 4 apply equally to vertical retort working.

Separate treatment of the purifier liquor would, of course, be uncalled-for were an efficient cyanide extraction plant in operation at a suitable point in the system.

In Table 5 are presented the results of the analysis of the mixed feed liquor used on the ammonia still, and of the effluent spent liquor obtained therefrom.

It is of interest to note the reduction in the figures for phenol and higher tar acids effected by simple distillation and settling. The bulk of the phenol thus removed was obtained in the devil liquor, which is here separately treated, to effect improvement in the effluent. The reduction in the figure for higher tar acids is attributed to separation with the carbonate of lime in the settling pits.

BIOLOGICAL TREATMENT OF EFFLUENT BY FILTRATION THROUGH MATURED COKE.

The practicability of purifying effluent spent liquor by oxidation on bacterial filters was briefly discussed in the Report for 1921, and further reference to the subject will be found in the Report for 1922, where the hope was expressed that opportunity would be found to carry out a series of large-scale experiments with a coke-packed filter erected at one of the gas-works in the London area. Experiments were finally made at three works. The results obtained by the works' chemists at two of these works are presented in Tables A, B, and C below. Coke-packed filters were also erected at Cornwall House for the determination of necessary data. The figures are encouraging, but do not carry one beyond the experimental stage; and the efficiency of the process, applied to a spoil tip of extensive area, composed of ungraded material, and subject to the vagaries of the English climate and to the disintegrating action of effluent spent liquor imperfectly distributed and of varying strength, has yet to be determined. Indeed, it was an appreciation of the difficulties that confront the technologist who seeks to translate laboratory into large-scale operations, that suggested the research, where an attempt is made to determine the conditions that make for the production of an effluent liquor containing the minimum weight of non-volatile impurities, in the hope that the subsequent treatment of such a liquor in the sewage beds, or on filters specially provided

* NOTE.—Thiocyanate is also yielded by decomposition of thiocarbonate formed by interaction of carbon bisulphide and ammonium sulphide. The conditions governing the formation and decomposition of ammonium thiocarbonate are obscure, but complete removal of carbon bisulphide is never effected in gas-works scrubbers. It has further to be remembered that the hydrocyanic acid equivalent of CS_2, weight for weight, is only 35 p.ct. (27 HCN = 76 CS_2), and that the amount of hydrocyanic acid normally present in crude coal gas (120 to 130 grains per 100 c.ft.) is far in excess of the amount of carbon bisulphide (under 100 grains).

TABLE 5 (from the Appendix).—*Feed Liquor and Effluent Spent Liquor Compared.*

Oct. 9, 1923.
6·5 tons S/A made per day.

Volume of Horizontal Retort Liquor to that from Vertical Retorts is About 2 : 1.	Feed Liquor from Storage Well for Horizontals and Verticals.	Effluent Spent Liquor from the Ammonia Still (Settled). (D/Liquor Separately Treated.)
Sample No.	13	14
Character of liquor	Yellow, clear	Dark brown, clear
Analysis—Parts per 100—		
Ammonia—free	1·07	*Nil*
fixed	0·32	0·023
Total	1·39	0·023
Sulphide, calculated as H_2S	0·038	..
Cyanide, " " HCy	*Nil*	..
Impurities "B"—		
Phenol, calculated as C_6H_5OH	0·275	0·093
Thiocyanate, calculated as CNS	0·212	0·148
Thiosulphate, calculated as S	0·071	0·042
"Higher tar acids," calculated as $C_6H_4(OH)_2$	0·290	0·056*
Oxygen absorbed (4 hrs., 27° C.). Parts per 100,000	940	390

P.Ct. of Impurities "B" Removed by Distillation.	Volume of Effluent : Volume of Feed Liquor 1·43 : 1·00 Calculated from Thiocyanate Figure taken as Constant.
Phenol	52
Thiocyanate	..
Thiosulphate	15
"Higher tar acids"	75*
Total (in terms of oxygen absorbed)	41

NOTE.—The d/liquor is here disposed of apart from the still effluent, and this, no doubt, accounts for the bulk of the phenol "removed by distillation."

If the volume of d/liquor be taken as 15 p.ct. of the still effluent, the volume of the united effluents would be 1·65 times that of the feed liquor entering (*see* Annual Report, 1922, pp. 14-16).

* It is probable that the reduction in the figure or what are termed "Higher Tar Acids" is due to colouring bodies coagulated and settled out with the carbonate of lime on standing.

for the purpose, might be reduced to more manageable proportions.

WORKS TESTS.

Works B.—The bacterial filter consisted of a small tower, 12 ft. high by 2 ft. diameter, open at the top and closed below by a perforated plate. A small feed tank with syphon delivery tube was placed so as to provide a regular flow of liquor to the tower, and the effluent treated liquor was received in a mixing and sampling tank below. The tower was packed with clinker: 9 in. of 2 in. to 3-in. boiler clinker on the bottom plate, 5 ft. 9 in. of 1-in. screened clinker above, and 5 ft. 6 in. of ½-in. screened clinker on the top.

The filter material was activated by mixing the boiler clinker with a small proportion of cow dung. Clean water was then circulated for a few days to spread and multiply the organisms prior to the commencement of operations. The feed liquor to be treated was obtained by diluting one volume of crude effluent from the ammonia still with nine volumes of filtered treated effluent. The filter was put into operation on Jan. 4, 1923, and continued in operation, practically without a break, until Feb. 28, 1923. The results obtained afford evidence that a satisfactory purification of the diluted effluent is effected when the rate of flow of the liquor is maintained at about 70 gallons of diluted effluent per cub. yard per day of 24 hours, and that the efficiency of the activated material remains unchanged for prolonged periods of working.

TABLE A.—*Average of 56 Days' Work.*

—	Crude Effluent from Still.	Feed Liquor as Diluted.	Effluent Treated Liquor.	P.Ct. Purification Calculated on the Crude Effluent from the Still.
Rate of Flow—				
Gallons per cub. yard per day	7	70	..	..
Composition—				
Pts. per 100,000—				
Phenol as C_6H_5OH	178	27·6	10·9	91
Thiocyanate as CNS	137	29·3	17·3	87
Oxygen absorbed (4 hours, 27° C.)	625	87·2	27·4	96

Works C.—Two boxes were used as filters, one containing 1 cub. yard of filter material, the other 1 c.ft. Liquor feed was by hand, the liquor fed to the smaller filter consisting of effluent from the first.

Two sets of experiments were carried out in May and August, 1923, by the Works Chemist. In the first set the filters were packed with unselected 2-in. to 3-in. clinker (containing about 30 p.ct. of coke) activated by a wash of pig dung; and the feed liquor to the larger consisted of crude effluent from the still mixed with the devil liquor. In the second set the packing consisted of graded coke activated by a wash of cow dung, and the feed liquor was crude mixed effluent, boiled with a view to removing a portion of the phenol. Results are shown in Tables B and C below.

TABLE B.—*Average Results obtained in May, 1923, with Rough Clinker.*

—	No. 1 Filter.		No. 2 Filter.
	Cubic Yard Box packed with Rough Clinker activated at start with Pig Dung.		Cubic Foot Box similarly packed and activated. Fed with Effluent from No. 1 Filter.
	Inlet.	Outlet.	Outlet.
Temperature of feed liquor °C.	20	..	..
Rate of feed—			
Gallons per c.yd. per day (8 hours)	3	..	4·5
Feed liquor—			
Pts. per 100,000—			
Phenol as C_6H_5OH	91	23	*Nil*
Thiocyanate as CNS	132	15	*Nil*
Oxygen absorbed (4 hours, 27° C.)	487	101	4
Character of liquor	Brown	Brown	Faint straw

	Removed. P.Ct. of Total Entering No. 1.	
Efficiency—		
Phenol	75	25
Thiocyanate	89	11
Oxygen absorbed	79	20

TABLE C.—*Average Results obtained in August, 1923, with Graded Coke (Hard).*

—	No. 1 Filter.		No. 2 Filter.
	Cubic Yard Box packed with Graded Coke and activated with Cow Dung.		Cubic Foot Box similarly packed and activated.
	Fed with crude effluent liquor *plus* devil liquor boiled to expel part of the phenol.		Fed with Effluent from No. 1 Filter.
	Inlet.	Outlet.	Outlet.
Rate of flow—			
Gallons per c.yd. per day of 7 hours	28	..	16
Feed liquor—			
Pts. per 100,000 oxygen absorbed	236	122	24
Character of liquor	Brown	..	Decolorized

	Removed. P.Ct. of Total Entering No. 1 Filter.	
Efficiency—		
Oxygen absorbed	48	41

(*To be concluded.*)

Gas Appliance Testing Laboratory for the United States.

The Executive Board of the American Gas Association have approved the recommendation of a Special Committee that an appliance testing laboratory be inaugurated. The idea is that the laboratory shall be established by, and operated under the auspices of, the Association. Some of the leading member companies of the Natural Gas Association of America have pledged their hearty co-operation. The purpose of the laboratory will be to test gas appliances for their degree of conformity with performance and construction of specifications now in effect or to be formulated in the future; and it is felt that the results should be to increase the safety of gas utilization, to raise the construction and performance standards of gas appliances, to eliminate as far as possible the use of inferior and inadequate appliances, and to provide the customer with the maximum utilization service possible. The United States Bureaux of Standards, Mines, and Public Health will co-operate in research work and assist in establishing some of the necessary safety requirements; and every effort will be made to create a laboratory certificate which will be acceptable as a national standard. The manufacturers have displayed an active spirit of co-operation by volunteering to contribute a portion of the equipment. For the other expenses it was felt by the Executive Board that the gas industry would—in view of the importance of this matter to all concerned—be more than willing to subscribe such sums of money as might be found necessary to put the laboratory on its feet. A plan of financing to cover a period of two years will shortly be placed before the gas companies; the hope being that by the end of this time the laboratory will be nearly, if not quite, self-supporting from fees paid by manufacturers for testing appliances.

FIRST WORLD POWER CONFERENCE.

GAS AND FUEL SECTION.

(*Continued from p.* 396).

WE continue the report of the proceedings at the meeting on July 7 of the Gas and Fuel Section of the First World Power Conference at Wembley, over which Mr. D. MILNE WATSON presided.

LOW TEMPERATURE CARBONIZATION.

By Dr. C. H. LANDER, D.Sc., M.I.Mech.E., Assoc.M.Inst.C.E., F.Inst.P., Director of Fuel Research under the Department of Scientific and Industrial Research.

[**Extracted.**]

Though the question of carbonization of coal at lower temperatures than those at present practised has been before the public for almost twenty years, it cannot be claimed that a complete solution of the many problems involved has yet been obtained. The degree of success, however, varies according to whether the matter be viewed from the standpoint of the commercial utilization of low-grade or so-called waste fuels, or whether it envisages the establishment of an industry on a national scale which would be capable of dealing with the tens of millions of tons of coal at present consumed in the raw state. In the former case the raw material could be debited to the plant at a low price, and so render possible a margin for profitable working, which would not exist if the coal carbonized were of such a quality as to command a price commensurate with that which the public would be willing to pay for the smokeless fuel produced.

Broadly speaking, the history of the subject so far as this country is concerned may be divided into two periods, the first of which dates from Parker's proposals in 1906. The aims of the early pioneers have been in the direction of obtaining a fuel which would be smokeless when burnt under the conditions obtaining in the domestic grate, and so alleviate the smoke nuisance of our large towns, though a certain amount of work had also been directed towards obtaining a fuel for use in gas producers of the ammonia recovery type, in order to get rid of the trouble caused by the caking of raw coal when used in such plant. The second period commences some seven years later, when, as a result of the inquiries of the Royal Commission on Fuel and Engines for the Navy, under the chairmanship of Lord Fisher, low-temperature carbonization was recognized as affording a promising method of providing a home-produced fuel oil suitable for use by the Navy and Mercantile Marine. It was clearly brought out that, as only some 6 or 7 p.ct. by weight of the coal treated appeared as oil, it would be necessary to find markets for the other products of carbonization in order to render the proposition an economic one. Prior to the appointment of the Royal Commission, the crude oil obtained by the early experimenters had been regarded as comparatively unimportant; but very early in the inquiries of this Commission, the possibility of using this oil for naval and marine purposes provided a new incentive to those who were at that time working on the problem. The subject was thus raised from one of comparatively small significance to one of national dimensions.

During the war the subject was brought into further prominence owing to the serious risk of shortage of supplies of fuel oil for the Navy; and several emergency inquiries were conducted in order to find suitable methods of alleviating the grave situation which had arisen. The only practical steps which were feasible were the development to the utmost of the Scotch shale oil industry and the diversion of as much as possible of the tar produced in the gas and metallurgical coke industries to such uses as would set free a corresponding amount of imported oil for use at sea.

In this manner, then, it was brought home to the Government in 1916 that some measure of State aid was necessary to the solution of this and many other problems which present themselves in the direction of the better utilization of our fuel resources, and it was decided by the Committee of the Privy Council for Scientific and Industrial Research in 1917, on the recommendation of their Advisory Council, to establish a Board which should be responsible for the promotion and co-ordination of research into fuel problems. It was, however, pointed out to the War Cabinet that, while the schemes of investigation proposed by this Board could have no possible effect in relieving the situation during the war, it was of paramount importance that the question of home-produced supplies of oil for the Navy should be exhaustively studied "in order that a definite decision as to the possibility or impossibility of the proposals should once and for all be arrived at."

Owing to the economic changes which have resulted from the war, the economic solution of the problem has proved much more difficult than was at first anticipated. Work of very great value has been done under the auspices of the Board and also by independent investigators, and accurate data on many doubtful points have been obtained. Much progress has been made towards a technical solution, and the elements of uncertainty still remaining are mainly those of an economic nature.

Though the above remarks have been directed to the subject of low-temperature carbonization of coal as a method whereby the smoke nuisance could be alleviated, and at the same time a considerable quantity of home produced oils obtained, the possibilities of development of the existing carbonizing industries to this end should not be overlooked. Broadly speaking, there are two methods of carbonization which have to be considered—viz., the gas-works process in which carbonization is carried out in externally heated horizontal or vertical retorts in which the temperatures of the heating chambers range from 1000° to 1300° C., and the coke-works process carried out in recovery ovens in which the temperatures of the heating chambers range from 1200° to 1300° C. As these processes are practised to-day, the findings of the Fisher Commission are as true as they were when the Commission reported in 1913. The quantity of fuel oil suitable for industrial purposes which is produced is so small that it hardly needs serious consideration when dealing with the broad question of a home supply. In addition, regular and profitable outlets already exist for the whole of the tar product of both the industries concerned; and it is certain that these outlets will continue to expand with the natural development of the industries.

The present trend of development in the gas industry is in the direction of obtaining the highest proportion of the potential heat units of the raw coal in the form of gas. While no development of the gas industry upon these lines can help towards the production of sufficient quantities of fuel oil for our requirements, signs are not lacking that this progressive industry is beginning to realize more and more the possibilities which their position affords them of becoming the largest suppliers of forms of fuel other than gas. Great attention has been paid lately to the development of the sales of coke for domestic purposes, and steps have been taken to overcome some of the disabilities of high-temperature coke which may have rendered it in the past somewhat unpopular as a household fuel. Attention is also being paid by the gas industry to the possibilities which are presented by fine grinding, blending, and briquetting as a preliminary to carbonization, with a view to obtaining a solid fuel which, while being produced at high temperatures, will be more combustible than the ordinary type of gas coke, and so more suitable for burning in an open grate.

The gas industry is also watching carefully the development of low-temperature carbonization from the point of view of the possibility of utilizing the rich gas from carbonization at 650° C. as an enriching agent for the raising of low-grade gas to a higher standard of calorific value. The calorific value of low-temperature gas is about 1000 B.Th.U. per c.ft. Its high concentration would enable it to be stored in relatively small holders from which it could be accurately metered into the general supply system. For enrichment it possesses advantages over other gases and vapours frequently used for the purpose, inasmuch as it owes its high calorific value to its large content of methane and other saturated hydrocarbons, which do not settle-out during storage and distribution. About 3000 c.ft. per ton (or 30 therms) is available in a straight carbonization process, and the tentative value put upon this asset by the Fuel Research Board is 4d. per therm.

The amount of oil obtainable varies with the coal used and the process adopted. In experiments with various types of coal in a bench of horizontal externally-heated steel retorts, the Fuel Research Board obtained yields of *dry* oil varying from about 13 to 20 gallons per ton. In this connection it is advisable to issue a note of warning against the high oil yields that are sometimes quoted. Such yields are often measured as wet tar, and are therefore enhanced in direct proportion to the amounts of liquor present. In the opinion of the Fuel Research Board it is not advisable, when considering the subject from the national point of view, to take a figure greatly exceeding 15 gallons of oil per ton of coal as the average obtainable from a wide selection of coals suitable for use in the process.

The characteristics of the oil vary considerably according to the type of coal used and the process adopted. The following characteristics may be expected in a process of straight low-temperature carbonization in which the oil has not been subjected to overheating.

1. That it will contain hydrocarbons chiefly of the paraffin, olefine, and naphthene series, and from 10 to 15 p.ct. of phenols.
2. That the quantity of benzene and its homologues will be small, but will be made up for by the presence of low-boiling hydrocarbons of the above-mentioned series.
3. That the higher phenols, such as cresol, will be more represented than phenol itself.
4. That the content of free carbon will be less than 2 p.ct., and that of pitch will be 35 to 40 p.ct.
5. That there will be up to 1 p.ct. of basic nitrogenous substances, including pyridine.

It is evident therefore that the oil possesses special properties not usually associated with natural fuel oil; and these properties have been reflected in the uses to which the comparatively small quantities made up to the present have been put—namely, as a raw material for the manufacture of disinfectants and for preservative paints. Several groups experimenting in processes of low-temperature carbonization have met with no difficulty in disposing of all of the oil which they have produced at a price of about 1s. per gallon at a time when foreign fuel oil could be obtained at a price in the neighbourhood of 4d. So long as the process is conducted on a limited scale, an enhanced price may be obtainable for the oils, but such markets are not likely to be commensurate with the magnitude of an industry established on a scale sufficiently vast to meet our national requirements. As fuel the oil will have to meet the competition of natural oil, the price of which is mainly controlled by foreign suppliers. At the

present time it is not safe to assume a stable value for the oil greatly in excess of 5d. per gallon.

For an oil to be suitable for naval or marine use, it is essential that it should possess the property of miscibility with natural petroleum. It is obvious that a ship must be in a position to take supplies from various sources; and grave difficulty would be experienced in the blocking of pipes and valves if an oil taken aboard is liable to throw down a deposit when brought into contact with the residue of a previous supply. The adaptability of crude low-temperature oil for mixture with natural oil has been investigated at H.M. Fuel Research Station. Seven oils were used: Shale, American, Burmese, Texas, Mexican, Persian, and Trinidad. Two of these (American and shale oils) were immiscible. Stable mixtures with Burmese, Texas, and Mexican oils were only obtained with less than 25 p.ct. of low-temperature oil. With Trinidad oil only was complete miscibility obtained, and even then application of heat was necessary. This disability is, however, being overcome by several processes which are being investigated at the present time; and the difficulty can also be surmounted by fractionating the oil.

Light spirits can be obtained, both from the oil and the gas, which are suitable for use in internal-combustion engines. The available yield of fine spirit from the tar amounts to 1 to 1·6 gallons per ton of coal, while that from the gas amounts to about 1·4 gallons, giving a total yield of motor spirit of about 3 gallons per ton of coal. This spirit is miscible in all proportions with petrol and benzole of the British Standard specification.

The possibility of establishing a low-temperature carbonization industry on a national scale depends largely upon the recognition by consumers of the superiority of the smokeless fuel over raw coal as fuel. To be effective from the commercial point of view, it is necessary that this recognition should take the practical form of its wide adoption by domestic users at a price somewhat in excess of that of the house coal which it would replace. From time to time small supplies of smokeless fuel have been placed upon the market from different sources, and good prices have been obtained. Broadly speaking, there is a consensus of opinion among those who have used it that it forms an admirable domestic fuel. In the types usually made, it contains from 7 p.ct. to 10 p.ct. of volatile matter, which confers upon it the property of ready ignitability. When produced from suitable coals by modern methods, it is sufficiently robust to stand transport without undue breakage.

Up to the present, small supplies of fuel have been disposed of at prices which were often considerably in excess of those of coal, but it must be remembered that such prices are not likely to be realized when fair supplies are obtainable; and it is necessary to find customers other than those who are enthusiastic in support of any scheme which will tend to ameliorate the smoke nuisance. The question still awaiting answer is, What extra price, if any, over raw coal, weight for weight, will customers be prepared to pay for smokeless fuel in consideration of its superiority?

The yield of coke per ton of coal by straight low-temperature carbonization amounts to about 14 cwt. on the average. It has been assumed in the computations which have been made in the past that the price obtainable for the coke, as a high-class domestic fuel, will be sufficient to meet the entire cost of the coal used. The possibility should not be neglected, however, that the smokeless fuel may only command a price equivalent to that of raw coal, weight for weight. It will be seen therefore that in the latter case the price obtainable for the liquid and gaseous products of carbonization must be sufficient to yield a profit after paying the cost of about 6 cwt. out of every ton of the raw coal treated, together with the entire costs of retorting. It is at the present time extremely difficult to draw up reliable estimates of the balance-sheet, owing to lack of knowledge as to capital costs of plant, and cost of upkeep and working, but it is evident that the possibilities of many suggested processes turn upon the considerations mentioned above. In short, a process which might prove a commercial success under the conditions of the coke paying for the whole of the coal assumes a totally different aspect if the price obtainable is only equivalent that of the raw coal, weight for weight. Also, under the latter conditions and with the assumptions made above regarding the prices of oil and gas, the greater the price of the coal the more is the process handicapped. Much harm has been done by the wild statements which have been issued from time to time and which have frequently exaggerated the yields of some of the more highly-priced products by as much as 100 p.ct.

Extravagant credits are often taken for the ammonia produced in low-temperature carbonization. In an average bituminous coal containing 5 p.ct. of moisture, the liquor yield would be approximately 10 gallons per ton from the coal itself and 11 gallons from the moisture, or (say) 21 gallons. For this liquor to be saleable it would have to be of at least 8 oz. strength or about 1·7 p.ct. ammonia, which means that a recovery of about 14 lbs. per ton would be necessary in order that this strength should be reached. Otherwise, circulation of the collected primary liquid in a scrubber would be necessary to reach this strength, and it is likely that only a small proportion of the total liquor formed could be concentrated in this manner. In view, therefore, of the small possible yield and the low prices obtainable at the present time, it is hardly worth while taking the ammonia into consideration in the balance-sheet of a straight low-temperature process. Of course, higher yields would be obtainable with processes in which some of the coke is completely gasified, as in the systems employing internal heating.

In the broadest sense there are two distinct lines whereby the problem of low-temperature carbonization may be attacked. The coal may be distilled in a gas-tight retort in which the whole of the heat for carbonization is passed through the iron or fireclay wall, or it may be exposed to the action of heat derived from the sensible heat of some substance which is mixed with the material to be carbonized. The substance forming the heating material is usually a large amount of producer gas, either generated within the retort itself, as in the Maclaurin type, or externally as in the Nielsen retort. Proposals have, however, been made from time to time to use materials other than producer gas for this purpose; these proposals including the use of superheated steam, heated low-temperature coal gas, melted lead, or hot sand—*i.e.*, internal heating.

In the first case, the quantities and qualities of the volatile products will average out to about 3000 to 3500 c.ft. of gas of a calorific value of 900 to 1000 B.Th.U. per c.ft., and 12 to 17 gallons of crude oil. The physical and mechanical properties of the coke vary over wide limits, but if a raw material be supplied which is not too rich in fusible constituents and at the same time has sufficient binding material to cement the whole together into a robust coke, the solid product will be suitable for a domestic fuel. When coal is carbonized according to the second method, the typical figures for the yield per ton would be about 20,000 to 25,000 c.ft. of gas of a calorific value of 230 B.Th.U. per c.ft. As the increased volume of gas is usually derived from the combustion of some of the coke in steam and air, there is a corresponding reduction in the amount of coke available for sale. The commercial success of the process therefore depends very largely upon the securing of a profitable outlet for this low-grade gas, and it is obvious that it is only suitable as a fuel gas for industrial purposes. The method is, however, exceedingly interesting and presents great possibilities owing to the low capital cost of the plant. In one process where the principle of internal heating is adopted, a figure has been taken of 1·8d. to 2·3d. per therm, the former being its value for steam raising in comparison with coal at 20s. per ton.

Dr. LANDER, in submitting his paper, said: I do not propose to take up your time by elaborating further the paper that is before you. I should like to lay stress, however, on the fact that, while being very gratified at being invited to give a paper on low-temperature carbonization before this section, I do not want you to think that the body which I represent here to-day is in any way prejudiced either in favour of or against its possible —and I say "possible" advisedly—development in the future. I have tried in this paper to present to you some of the favourable facts, but we must not forget at the same time that there are a number of other factors which render the subject one of the most extreme difficulty. The subject has now been before the public for something like twenty-five years, and large amounts of private money and a considerable amount of Government money have been spent in the effort to arrive at a solution. While this solution from the technical side—the obtaining of the products, coke, oil, and gas—is (one might almost say) solved, the problem which is before the public, and which is before the gas industry, at the present time is whether this can be done on an economical basis. That is to say, whether by the expenditure of £1 on a process of low-temperature carbonization it is possible to get (say) 22s. or 25s. worth of products after you have paid all the costs. I am afraid I am putting it in a very crude way. The question is really of very much larger significance, which is being investigated continuously by the organization I represent.

One of the most important developments in front of this organization, and in front of the gas industry, is the question of the utilization of coals which are not otherwise suitable for either gas making or perhaps for low-temperature carbonization. There are indications that suitable products—coke, together with adequate yields of oil and gas—can be obtained by systems of blending. This, however, is by no means associated merely with the subject of low-temperature carbonization, but along with it is associated carbonization in general. I need hardly refer to the work which has been done by the gas industry in connection with getting a smokeless fuel made both by high-temperature and low-temperature carbonization, in which this question of blending is of paramount importance.

I would strike a note of caution as to the yields which are sometimes quoted as being possible by low-temperature carbonization. In this I am not attempting to discredit in any way the work which has been done by the many groups interested in the subject; but one often finds these yields quoted, and one can only say they must have been obtained on rather special types of coal. At East Greenwich we have experimented with something like a hundred different types of coal in a very straightforward type of low-temperature plant, and, with the exception of about two cases, I have still to meet the 20 gallons of oil which are quoted by people who, I think, ought to know better.

Discussion.

Prof. H. E. ARMSTRONG asked to be allowed to exhibit what he thought was perhaps the most remarkable specimen of low-temperature carbonization yet produced. Those of them who knew anything of Kent coal were aware that it was exceptionally friable, and therefore difficult to transport. This specimen represented an 8 in. core 9 ft. long of low-temperature coke made from Kent coal, by four hours carbonization at 600° C. and with an 80 p.ct. yield of this material. There is another specimen made from Nottingham coal. It was very similar in character, but gave only about 60 p.ct. of the solid product

and 30 gallons of oil. In future the gas industry had to think not only in gas, but in materials of this kind. It was possible, by varying the different factors, to produce a fuel of any desired quality as regarded combustibility. This was a very fine grade material. It had, perhaps, 8 p.ct. of volatile still in it, and burned with extreme readiness. He looked forward to the time when they would have got rid of the coal merchant, and when gas companies would supply them with gas and this material. With such a smokeless fuel, which burned in the most beautiful way possible, they had something of aesthetic interest. Gas appliances were severely practical, and he trusted in future they were not going to give themselves up wholly to pounds, shillings, and pence. His object was to show them an excellent specimen of a material of very beautiful character, which he thought would be the means sooner or later of setting a great coalfield on its feet.

A DELEGATE FROM RUSSIA spoke at length (through an interpreter) on the fuel resources of Russia. The deposits of coal in Russia, now known, will be exhausted in about 180 years, though the opening of new fields and economies in methods of consumption may alter this calculation. Such economy has been noticeable for a few years past, and especially since the war. Russia has 38 p.ct. of the world's oil, but she has only 20,000 tons of coal per square kilometre of territory, against 600,000 tons in Great Britain, which is thirty times less. Russia is rich in peat, and this material is gaining more and more in importance each year.

Mr. DAVID BROWNLIE thought that one of the defects of the conference was that there had not been anything like due consideration given to the question of low-temperature carbonization. There were over sixty processes in the world at the present time. The gas industry did not quite realize yet the advantages of low-temperature carbonization. They had heard a lot about co-ordination, and it was co-ordination they wanted. He did not wish them to think he was antagonistic to the gas industry, but everything had disadvantages, and the two disadvantages of the gas industry were that it gave a low-grade coke, and entailed enormous cost of transmission. He had heard that morning that gas could be sold at 4½d. per therm; but generally it was 12d. He supposed he was not far wrong in saying it cost in this country 4½d. per therm to put the gas in the holder; and it costs 12d. to sell that gas ("No"). Well, about one-third of the figure received was the cost of transmission. This was because of the low pressure, and the huge capital already sunk. It would be far better to develop low-temperature carbonization.

Mr. W. G. ADAM appealed to representatives of the United States and Canada to give, if possible, some information regarding the Ford plant. He understood the Ford Company had expended a large sum in installing a lead-bath low-temperature system.

Herr ZUR NEDDEN (Berlin), on the subject of low-temperature carbonization, stated that, as regarded the technical side, several processes had been developed with fairly good success in Germany, but the economic question was still very much in doubt. He thought it was necessary that a note of warning should be sounded. This matter of low-temperature carbonization would not go ahead very quickly; there was still a large amount of work to be done. They had found at the root of the whole economic problem the time of carbonization. Those processes which included the least time of carbonizing were probably the ones that promised the greatest economic success. They had an extreme example in this connection in the process developed by Mr. Caracristi in the United States, who was now building two plants for the Ford Company. In this process* the fuel was carbonized on a bath of molten lead, and the carbonization took 5 min. 26 sec., which is the lowest carbonizing time known. It stood to reason that with a plant of this description the first cost came down to a minimum, and therefore this seemed to be a step in the right direction.

Mr. A. C. FIELDNER (United States Bureau of Mines, Pittsburgh) said he saw the Ford plant before it was in operation. It was a beautiful plant, provided it operated successfully. To the chemist it made particular appeal, because one had there a ½-in. layer of powdered coal in contact with a lead bath of a definite and known temperature. It was a very interesting experiment, but, of course, they knew nothing about the economic side of the process at the present time.

Prof. H. E. ARMSTRONG: May I ask how the lead which clings to the material being carbonized is recovered or dealt with?

Herr NEDDEN: The coal comes down on to solid metal cast-iron plates on a sort of continuous conveyor that passes along on the lead bath. The coal is not supposed to come in contact with the lead.

Mr. ADAM: I should like to know whether liquid products have been used for timber preservation. I understand the Ford Company are trying experiments for using the liquid products in place of creosote.

Mr. FIELDNER: I understand they are trying, but I am sorry that I do not know anything about the result of the experiments.

Mr. F. H. JONES (who was temporarily occupying the chair) said he had never met Mr. Brownlie before, but he was typical of many people he had met. He knew the opinion prevailed that the gas companies were against low-temperature carbonization. They were not, and they knew a great deal more about it than many people thought. There was a low-temperature plant in London 25 or 30 years ago. He personally went down to see it, and a great many people in the gas industry had been watching the subject. They had had proof that day, in the different opinions expressed as to low-temperature carbonization, that it was not a very simple thing. But it was absolutely false to think the gas industry was against it. When they were satisfied it would pay, they would go in for it. As to the price of gas, he thought he was right in saying the 12d. per therm quoted by Mr. Brownlie was 50 p.ct. more than it should be. The gas industry was out to do the best it could for the consumers, and when there was a good low-temperature plant the gas companies would be after it. The gentleman who had read this paper knew more about the subject than anyone else. The Fuel Research Board would tell them anything as soon as they themselves knew it, and until they told them there was something good, the gas industry would do without it.

Dr. LANDER thanked Mr. Fieldner for taking the brunt of the answers. The Caracristi process was one the Fuel Research Board had taken great interest in. Mr. Ford was out to make pulverized fuel, and was making it with a plant he thought was a very good one for the purpose. One of the things they were out for in this country was to make a solid fuel to replace the present solid domestic fuel. He thanked the Chairman for his remarks. He knew that if a suitable process could be brought forward the gas industry would be the first to take it over, and so make themselves the central organization for the supply of fuel in the district. This would tend to great economy. That much depended on carbonizing in thin layers had been known for a long time, but still they had not got an economical plant which would do it. There were three ways in which the time of carbonizing could be quickened up. The first was by using thin layers; secondly, in the way recently described by Mr. Evans before the Society of Arts; and, thirdly, the method advocated by Messrs. Sutcliffe and Evans, in which the time of carbonization was decreased by increasing the conductivity. The 4d. per therm mentioned in his paper was simply a hypothetical figure. He would welcome the day when someone would produce balance-sheets showing that a good method of low-temperature carbonization was forthcoming.

* Some details of this process will be found in the "JOURNAL" for Aug. 15, 1923 (p. 534).

THE CO-ORDINATION OF FUEL SUPPLIES.

By E. W. SMITH, D.Sc., F.I.C. (Technical Director of the Woodall-Duckham Companies).

[Extracted.]

After food and drink, fuel is by far the most important human requirement in all but torrid zones. There is, therefore, ample justification for the treatment of this subject. Great Britain owed her pre-eminence during the nineteenth century largely to her possession of cheap coal. Latterly the cost of coal has greatly increased, and her commercial rivals have developed their own sources of fuel. The start that she gained has been very much reduced owing almost entirely to the wanton use of her riches in the form of coal. It is only in recent years that any serious attempt has been made to use coal efficiently; and its present comparatively inefficient use is a millstone round the neck of industry. The effect of dear coal used inefficiently is felt directly and indirectly by all, and there is no subject that deserves more serious attention from the governing powers. Coal is used generally in this country—directly and indirectly—both in industry and domestically. It is the source of the bulk of heat and power, and in the ultimate its cost absorbs a large percentage of the earnings of the majority of our countrymen. The indirect costs of coal, due to dust, dirt, smoke, dull days, screened sunlight, fogs, mists, lung diseases (caused by the inhalation of aerial sewage) have probably a still greater effect on the reduction of the effective earning power of the worker than the direct cost of coal. There would appear to be, therefore, ample justification for raising this subject on an important occasion such as this, because if all were done that might be done through improved co-ordination, better organization, and more efficient methods of utilization, there would be cheaper heat, light, and power, and a radical improvement in industry, health, and human happiness.

The following figures are compiled from the Second Report of the Secretary of Mines, 1923. They show the directions in which coal is used.

Balance-Sheet of Coal Production in Great Britain.

Total tonnage raised, 1922 . . 249·6 million tons.

	Millions of Tons.	P.Ct. of Total.
Exports	64·2	25·7
Coal carbonized.—At coke-ovens	13·3	5·4
At gas-works	16·5	6·6
Manufactured fuel	1·2	0·5
Electricity generating stations	6·8	2·7
Railway companies' locomotives	12 6	5·1
Coastwise and foreign bunkers	18·3	7·3
Blast furnaces	0·9	0·4
Collieries' engine fuel	16·2	6·5
Miners' coal	5·8	2·3
Domestic fuel	38·0	15·2
Engineering, shipbuilding	20·0	8·0
Textiles	7·0	2·8
Food and drink	3·0	1·2
Chemical trade	5·0	2·0
Paper	2·0	0·8
Building, &c.	5·5	2·2
Miscellaneous industries	8·3	3·3
Mercantile transport, &c.	5·0	2·0
	249·6	100·0

There are two main directions in which improvement may be looked for. Coal may be mined, distributed, and utilized with greater efficiency, and, through better co-ordination among those industries that use coal, it should be possible materially to reduce the effect of the cost of fuel in all its applications. If the effect of unnecessary haulage on the cost of coal were adequately realized, a great impetus would be given to the movement for a better co-ordination of our fuel supplies. The word fuel used in this paper is intended to cover solid fuel (coal and coke), gas, and electricity—all the means of obtaining light, heat, and power. Oil is not included, as it is relatively unimportant.

The average railway haulage of the whole of the 250 million tons of coal mined is 50 miles. This at once increases its average price by between four and five shillings a ton. Fortunately, industry—and therefore the densest population, as is to be expected—is to be found in close proximity to the coalfields, if the

London area be excepted. In spite of this, the *average* haulage is 50 miles. Very little can be done in the direction of carrying industry nearer the pit mouth.

Power stations, which in 1922 only absorbed 2·7 p.ct. of the coal mined, could in many cases be placed nearer the pit mouth, where water is sufficient, or they could be built in many cases so as more easily to take the cheaper sea-borne coal. Coke-ovens are almost invariably situated close to collieries. Electricity can be profitably distributed for longer distances than gas. It is cheaper to distribute coal for distances of over 20 miles than it is to distribute gas. There would therefore be no advantage in locating gas-works at the pit mouth, unless there were an adequate demand for gas in close proximity to the works.

Much, however, may be done by the colliery in the direction of coal cleaning. It has been estimated by Sir Richard Redmayne that 45 p.ct. of the coal produced is small coal. Of this, only 4 p.ct. is being washed, the remaining 41 p.ct. being distributed unwashed. Some coal does not require washing, but it can safely be assumed that the whole of this coal will average at least 10 p.ct. of ash. The true coal ash would be under 5 p.ct., and there is no doubt that practicable methods of coal cleaning are available that will reduce the ash of most coals down to below 7 p.ct. If this were done there would be an annual saving in transport alone of at least 4,000,000 tons of inert material.

Another direction in which greater co-ordination might be effected is in the drying of coal. It is absolutely unnecessary for any coal to leave the colliery higher than 5 p.ct. of moisture, yet 10 p.ct. is usual, and a further 4,000,000 tons of useless material are being hauled. The removable ash and moisture not only, on the average, increase the cost of transport and handling at destination by at least 10 p.ct., but as inerts they seriously reduce the efficiency of the coal when put to use either in the gas-works or electricity station. Every ton of water or ash brought from South Wales to London costs about 13s. in addition to the pit price. About 10s. 6d. per ton as railway rate and wagon hire has to be added to the pit price of coal brought from Notts, Derbyshire, Warwickshire, Leicestershire, and Staffordshire, and 12s. for Yorkshire coals to London. The comparatively small domestic user of one to two ton lots feels the effect of these enhanced charges for useless material, because merchants' profits are based on the costs to him, and to this is added a relatively high cartage rate of at least 6s. per ton from siding to house. The collieries will have to give much greater attention to this matter, and do their part in advancing the highest national interests.

In all coalfields a large proportion of coal is lost in mining, due chiefly to faults, disturbances, crushes, essential pillars left *in situ*, and the stowing away of slack. Considerable slack coal is inevitably produced in mining, and naturally becomes intimately mixed with dirt. Consequently this fraction is in least demand in industry, the result being that large quantities are left underground and stowed away in the gobs, or goaves. The proportion of our coal resources lost as above indicated is in the region of 30 p.ct., and 25 p.ct. may be a fair estimate of the proportion of slack left in the gob, to serve no useful purpose. It is difficult to give an accurate estimate of the proportion of slack brought out of the pits, because coals vary so widely in character and hardness. A splint or spire coal may yield a minimum of slack, whereas 40 p.ct. of the output of a soft dry steam or semi-anthracite may consist of slack. An average figure for the percentage of slack brought to the bank would be of the order of 25. All slack coal should be cleaned at the pits and the ash contents reduced to below 5 p.ct., thus saving transport costs and releasing traffic otherwise required. The tailings from the washery, which may carry up to 50 p.ct. of ash, should be used on the spot in raising steam at the colliery. It is common practice to do this at many pits, with the result that the collieries concerned have a larger surplus of cleaned marketable coal. The most suitable places for the utilization of inferior slack and tailings are those at or near the pits, where transport costs are at a minimum, or where the high ash can be usefully dealt with. At large collieries it would probably be found most economical to use the tailings in powdered fuel plants which ensure complete ashification. The finely-divided ash is then probably in a suitable condition for distribution instead of stone dust for dusting mine roadways. Anything that can be done to eliminate freight from the colliery to the user should be done. This can be accomplished by the reduction of inerts such as ash and water in coal, and by the more efficient utilization of the coal by the user.

The domestic consumer takes for household use over 15 p.ct. of the coal mined. The domestic fire is the greatest cause of the smoke nuisance. It still has an appeal for some, in spite of all its inconveniences and disadvantages. For many years to come there will be a demand for solid fuel for domestic use, irrespective of the radical improvement that has been made in the efficiency and appearance of gas fires. The price of electricity will have to be very materially reduced before it is anything but the luxury of the fortunate few—for general heating purposes. It is essential, therefore, that a cheap free-burning smokeless fuel should be developed and put on the market. Serious efforts have been made to do this by means of low-temperature carbonization. So far all such efforts have met with failure. The processes are not self-supporting when the resultant solid fuel is sold at an attractive price. If success is to be attained in the production of a satisfactory smokeless fuel, it can only come through the instrumentality of the gas industry, and high-temperature carbonization. There is no reason why within a very few years the whole of the coke available for domestic sale should not be in the form of free-burning smokeless fuel, and produced under such conditions as to effect an actual reduction in the price of gas.

The gas industry uses coking coals (6·6 p.ct. of the total coal mined), washed and unwashed, large and small. It cannot use highly-volatile non-coking coals for gas making. It would be of economic advantage if all coals of gas-making quality, coking and non-coking, could be made available for gas making. This problem should not be impossible of solution. If this can be brought about, then in many places local coals will be made available, freights will consequently be reduced, and with the reduced cost of coal, gas rates will go down and gas consumptions increase. The gas industry makes gas its main product, and any increased price that can be got for the secondary products, such as coke, tar, and ammonia, and any reduction in operating costs on any part of the plant, tend to reduce the price of gas.

The public gas and electricity supplies should never have been divorced. The amount of coal required by gas undertakings as compared with electricity undertakings is as 6·6 : 2·7, but the number of therms sold by gas (as gas) and electricity undertakings is as 6 : 1, or 18 : 1 if coke be included. The gas and electrical industries are essentially public services, and in the majority of cases could be run more economically by putting them under single control. The electrical industry requires about 6·8 million tons of coal a year. The gas industry has available for sale 8 million tons of coke, of which about 1 million tons is in the form of coke-breeze of reduced market value. This is bought up largely by privately-owned power stations for steam raising, and freightage becomes proportionately a large item. This material, with or without treatment, could be more profitably used by power stations attached to gas-works. In recent years gas undertakings have paid special attention to the utilization of waste heat. It is safe to say that if all the obtainable waste heat were used for power production, it would be equivalent to one-seventh the production of electricity in Britain, and the exhaust steam would be available for gas making and chemical processes. The co-ordination of gas and electricity would inevitably tend to increased efficiency and reduced costs of production of both.

From experiments that have been carried out recently, it has been found that a non-gas house requires one ton of coal for every 15,000 c.ft. of gas (500 B.Th.U. value) used in a similar-sized all-gas house. This figure corresponds to the make of gas in a modern plant from a ton of coal. But one ton of coal liberates ½ ton of coke for sale, so that there are 8 million tons of coke for sale in the country. If this coke could be made free burning, as it may be in the near future, it will displace coal for domestic use, and for every ton of coal displaced it will only be necessary to use either 15,000 c.ft. of gas, and leave ½ ton of treated coke for other purposes, or, better still, the coal will be replaced by ⅓ ton of treated coke and 10,000 c.ft. of gas. This coke and gas are made from ⅔ ton of coal, which shows a saving of 33 p.ct. of the domestic coal used, equal to 12⅔ million tons a year. The main point about these approximations is that it is very much more efficient to use gas, together with coke, for domestic purposes, than to use raw coal.

The gas and coke-oven industry cannot be separated and put into watertight compartments. Most coke-ovens are within five miles of populations that are available to consume all the gas that can be made from coal that is coked. Increases in gas-works plant when surplus coke-oven gas is available of satisfactory quality should be unthinkable, and yet very few gas undertakings buy gas from coke-ovens. There are difficulties, but these can be overcome in most cases. The coking industry has not, however, very much surplus gas available, though 13·3 million tons of coal are coked every year. If all this coal were coked in the most efficient producer gas-fired ovens, the gas available for town purposes would be approximately three-fifths of the gas requirements of this country. If only the surplus gas were available (60 p.ct. in modern ovens), the coke-oven gas would correspond with 36 p.ct. of the country's gas requirements. It actually corresponds, under present-day practice—beehives, waste-heat, and regenerative ovens combined—to little over 12 p.ct. of the country's requirements, and only a small fraction of this is sold for town purposes.

It will be accepted that there is much room for extensive co-ordination of supplies, of management, of products, and of effort between all the interests involved, including the collieries, gas undertakings, electricity undertakings, coke-ovens, industrial users of fuel, and, most important of all, the domestic user. This co-ordination may be brought about:

1. By improved working results at the colliery.
   (*a*) By coal cleaning, reducing ash and moisture.
   (*b*) By increasing the percentage of coal sold of the coal found.
   (*c*) By coking where possible, and producing gas and bye-products under cheapest conditions.
2. By improved conditions at coke-ovens.
   (*a*) By installing, when practicable, efficient ovens.
   (*b*) By working in conjunction with other industries to mutual advantage.
3. (*a*) By combining electricity and colliery undertakings, or
   (*b*) By combining electricity and gas undertakings, and utilizing all the facilities of each for the common good.
4. (*a*) By utilizing to the full the waste heat available on gas-works.

(*b*) By the production of free-burning smokeless fuel instead of coke for domestic consumption.

(*c*) By utilizing high-volatile and cheaper non-coking coals for gas making.

(*d*) By demanding lower ash and moisture coals.

5. By a close study of the effect of freight on the cost of production of energy of whatever form, due to lack of practicable co-ordination in what should be interdependent industries.

6. By the co-ordination of gas undertakings themselves, and the elimination of many inefficient and geographically unsuitable undertakings.

Dr. SMITH, in introducing the paper, said: The chief reason why there is the necessity for co-ordination of fuel supplies has been brought home to us this week. The country cannot afford an electrical industry unless there is co-ordination of the fuel supplies. The country cannot afford to make electricity a household commodity of universal use in conjunction with gas unless there is co-ordination between electricity and gas undertakings. I hope that this point of view will be put to them—that, although the gas industry is desirous of carrying on independently, without any special Government direction, it will be necessary for the electrical people to come to us and insist that we should co-ordinate with them in order to enable them to carry on more cheaply. If there is to be any co-ordination, that co-ordination must be brought about by independent direction. It cannot be brought about by a continuation of the haphazard methods of development that have been usual in the gas industry up to date. This is not a statement which is made with any loose thinking. It is a statement, I believe, of fact, that it will be necessary for the gas industry itself, as the parent fuel body, to initiate a co-ordination of the fuel supplies by definite Government Commission. It is impossible to conceive of it being done in any other way than by some unifying authority.

In this connection, with the consent of Sir Arthur Duckham, I would like to give some short account of experimental work which has just been completed on a large scale, as a means of considering with advantage the proposals of our low-temperature carbonization friends. I have not seen any statement as to what the low-temperature people have to offer the gas industry. The oil that is produced is still of mythical value. What I mean is, a market has to be found for that particular oil, or it has to be further treated. The solid fuel produced is excellent, and is what is wanted, but the price at which it is produced is so high that it is not attractive to the ordinary consumer. If that fuel is the fuel we want, the problem to be overcome is a method of treatment to get the same results. These experiments just completed are not novel. They are experiments which show that, if coals are suitably ground and blended, either with one another or with coke dust, it is possible to produce a free-burning smokeless fuel in two-thirds the normal coking time. Further demonstrations on a large scale have shown that briquettes made under low-pressure conditions need less than half the amount of pitch or other binder normally used. These briquettes can be carbonized in vertical retorts, and first-class coke made, in carbonizing times 40 to 50 p.ct. quicker than is normal with the best vertical retort practice. The cost of preparation and briquetting amounts to about 2s. 5d. per ton of briquettes. By carbonizing these briquettes, it is possible to reduce by 50 p.ct. the labour that is normally used on the top of vertical retorts. All through the test no attention was in any way necessary for the rodding of the retorts. Owing to the free passage of the gas, the make of therms was considerably increased. In other words, the therms normally lost by ordinary pressures in the retorts were conserved for gas-works purposes. Those matters may stimulate interest. There are many other workers on this subject, but you will probably be interested in the demonstration on a large scale which has taken place, and which will be the subject of more detailed research work in the immediate future. I have nothing further I wish to emphasize.

Discussion.

Mr. DAVID BROWNLIE said he had read Dr. Smith's paper with great interest. He gave figures copied from the Second Report of the Secretary of Mines, but these Government figures did not seem to be very well expressed. It would have been a big advantage to have set out the actual uses of coal. Far and away the biggest use for coal was for steam boilers, and these figures did not show it. Some 45 p.ct. of the coal used in this country was under stationary land boilers, and another 15 or 20 p.ct. was used with locomotives and steamers. In other words, 65 p.ct. was burned under boilers for steam generation. Therefore, he thought, more attention should be given to steam generation in connection with the co-ordination of fuel supplies. Dr. Smith might have laid a little more emphasis on the fact that the colliery industry did not burn their refuse on the spot. He (the speaker) examined a hundred colliery plants in this country representative of a coal bill of 1½ millions per annum, and his estimate was that, if the collieries of Great Britain would adopt scientific methods of burning coal under their boilers, they could save 3½ million tons a year. Most of the coal they were burning to-day was saleable coal. As to pulverized coal, tests with two plants in Milwaukee showed that 29 p.ct. and 20 p.ct. of the ash was blown up the chimney. The Ford people had much more at the back of their heads than some people imagined. They saw the future was going to be very largely pulverized coal, with low-temperature carbonization.

Mr. E. W. L. NICOL remarked that Mr. Brownlie had just referred to pulverized coal. In that hall, a few days previously, Mr. J. Anderson, from Milwaukee, had told them that he ejected from his chimney shaft no less than 85 p.ct. of the ash from the coal he used. In London, if they generated with pulverized coal only half of the power they required in electricity, this would mean depositing no less than 2000 tons of ash a day on the London area; and he suggested it was a point that should be brought to the notice of the Ministry of Health.

Dr. C. H. LANDER said he was very interested to hear what Dr. Smith had had to tell them about quick carbonization, because at the Fuel Research Station they had tried this. They had not gone so far, perhaps, but he could confirm in a general way everything the author had said with regard to pulverized fuel and briquettes.

Mr. H. W. BROOKS (Fuel Engineer, United States Bureau of Mines) said the problem of ash disposal was one to which he had given much attention owing to an inquiry which reached the United States Bureau of Mines from the Pacific Coast. A statement was made that a number of domestic plants in hotels and boarding houses burning pulverized fuel had been taken out, owing to the deposition of unburnt carbon on the window sills. He wrote to the Municipal Smoke Inspectors of two cities where pulverized fuel was burnt, and asked what results had been observed as to the deposition of ash. The replies were that careful investigation had been made, and that in so far as they had been able to observe there had been no destructive effect and no observable deposition of unburnt carbon or ash in the surroundings of pulverized fuel plants. This was probably owing to the fact that it was emitted from the stacks in the form of fine dust. Several of the plants taken out were afterwards restored.

Prof. F. K. THOAN HERSON (Limburg) remarked that from what he had seen of the atmosphere of London in winter time, he thought that it would not be so much spoiled if they had the ash instead of the smoke they now had. He used pulverized fuel, and his opinion was that one had fewer complaints than was the case nowadays with mechanical stokers.

Dr. SMITH said there was not very much to reply to. It always occurred to him, in connection with pulverized fuel, to ask whether, with the mechanical grate, the extra few per cent. efficiency that could be obtained with pulverized fuel was justified in view of the cost of preparation. The cost of preparation, he knew, was small, but the advantage was small. As to the tests to which he had referred, he had omitted the most important factor of all—that any type of coal, coking or non-coking, was being used in these tests; and this placed at the disposal of the gas industry the whole of the high volatile or the moderately volatile coals that might be available.

Mr. FRANK H. JONES (who was temporarily presiding) said he hoped the gas industry was not going, with its co-ordination, to try to get more Government control. They did not want any more Government control. Let them work with the electricians and the collieries, but what power he had he would use to prevent the industry getting more under Government control. Dr. Smith said that the gas industry had come up-to-date more or less in a haphazard way. A great many of them had been in the gas industry a long time, and that morning they had been hearing what an efficient industry it was. He wished to say that the gas industry had not been managed in a haphazard way. Birmingham and the Gas Light and Coke Company, among others, had very excellent laboratories, and the great efficiency boasted of that morning had not grown up in the haphazard way which had been suggested. ["Hear, hear."]

Mr. MILNE WATSON (on re-taking the chair) remarked that they did not want Government control in the gas industry, and he did not believe it would lead to their getting on any faster. He also agreed that the gas industry was not haphazard. It had been conducted under scientific management.

THE LIQUID BYE-PRODUCTS OF COAL CARBONIZATION AS SOURCES OF POWER.

By W. GORDON ADAM, B.A.

[See "JOURNAL" for July 9, p. 254.]

Mr. W. GORDON ADAM, in introducing the paper, said: It is unfortunate from the point of view of this paper that only one of the liquid products of the carbonization of coal is at the present time used for power—that is benzole. The other products are more valuable in other industries than if used for fuel. For the gas industry this is very satisfactory from a financial point of view. We have heard a great deal in this conference about the universal gas age. This opens up the possibility of very large quantities of liquid bye-products being available. It ought to be borne in mind that, if this ever happens, these liquid products will not have the value they have at the present time. Undoubtedly there will always be a certain quantity used for dyes, &c., but the production of these will be confined to the factories, which are suitably situated geographically, where the first quality can be produced. The fact that only one liquid product is at present used for power, limits my remarks, and I am afraid will limit the discussion.

There was no discussion on the paper.

Gas in the Textile Industry.—Few people other than those actually engaged in the manufacture of cotton and other materials are aware of the important part which gas plays in their production. One Yorkshire mill engaged in the manufacture of silks, velvets, and plushes is a customer of the local gas undertaking to the extent of nearly 12 million c.ft. of gas per annum. The demand for gas by textile mills in such important centres of the industry as Accrington, Blackburn, Bolton, Burnley, Oldham, and Stockport is a very large one, and has a material effect upon the total output of gas for industrial purposes in those areas. The current issue of "A Thousand-and-One Uses for Gas" (No. 124) deals with the applications of gas to meet the varied needs of the textile industry, and describes with a number of photographs three processes in which gas is used extensively—namely, gassing, singeing, and calendering.

INTERNATIONAL ADVERTISING CONVENTION.

PUBLIC UTILITIES SECTION.

(*Concluded from p.* 391.)

In last week's "JOURNAL" there was given an account of the first of the two sessions at Wembley which were devoted to the Public Utilities Section of the International Advertising Convention. This was presided over by Mr. F. W. Goodenough, as Chairman of the British Division of the Committee. On the following morning—Wednesday, July 16—the second session was held in the Cinema Theatre of the Canadian Pacific Railway building; the proceedings on this occasion (of which a brief account follows) being presided over by Mr. FRANK LEROY BLANCHARD (Director of Public Relations, Messrs. Henry L. Doherty & Co., New York).

CHAIRMAN'S OPENING REMARKS.

The CHAIRMAN opened the proceedings with a short address, in the course of which he remarked that they had an exceedingly interesting programme before them. It was a highly significant gathering; for it was the first attempt that had ever been made to get together public utility men representing all the different industries. He hoped, and Mr. Goodenough hoped, it was going to mark the beginning of a closer relationship between those who were engaged in handling the advertising of these undertakings. There was a time when a good many people thought that the gas industry would be ruined by electricity; but all who had watched its development during the past twenty-five years were conscious of the fact that the gas industry was probably in better shape now than it had previously been. While they had lost in the lighting, they had gained in the direction of heating; and the rapidity with which the increase in the heating load was taking place in the United States led to the belief that they were at the beginning of an era of prosperity in the gas industry such as it had not known hitherto. The electric light industry had had a remarkable expansion; many new ways having been found of using the current. "These two wonderfully successful industries are," he said, "marching along together, and must work together on these problems of advertising. In both industries the business is there, if only it is developed; it must be gone after. We have to persuade people to use our commodities; to make them think they must have these commodities in order to get out of life to the full the comforts that are available. This has to be done by advertising, as well as by personal solicitation. The more effective we can make our advertising, the more rapid will be the increase in our business."

RESULTS FROM PUBLICITY.

Mr. LUCIUS S. STORRS (President of the Connecticut Company, New Haven) submitted the first paper, which was on "The American Traction Situation, and the Part Publicity has Played in It." He declared that possibly nowhere may be found more concrete proof of the good results of advertising and publicity than in the United States electric railway industry. The monetary result is not the only one that has accrued from this publicity. It was quickly realized that advertising is wasted unless service goes with it, and as a consequence service has greatly improved. Furthermore, the advertising men have brought most of the executives out of their shells. The public now realize that they do not have horns, as demagogues long have insisted; and the public and managements alike have learned the wisdom of Charles Lamb's remark to the effect that it is difficult to dislike a person one knows. A number of the electric railways are approaching a 2 p.ct. gross appropriation of revenue for the purpose of advertising.

Mr. F. W. GOODENOUGH remarked that one of the things in the paper which particularly appealed to him was the statement that advertising brings the executives out of their shells. This was quite true, for it brings them into contact with the public. It is very important that a public utility should be known by its staff, and by its executives, to as wide a circle as possible. The representatives of public utility undertakings should never write a letter if they can arrange an interview. One can settle more in five minutes' talk than one can settle in five letters. He was very interested in hearing the author refer to 2 p.ct. of revenue being spent in advertising, and only wished it were possible to get public utility companies in this country to spend even 1 p.ct. This would enable much more to be done than is possible at present. An enormously greater sum than is now being spent could be spent in this country, with profit to the undertakings, and also with profit to the public through the cheapening of the product by the increasing of the demand. This was a point which must be brought home to everyone.

THE PERSONAL ELEMENT IN PUBLIC UTILITY ADVERTISING.

Mr. EVELYN BOYS, M.C., A.C.I.S. (Secretary of the North Metropolitan Electric Power Supply Company), contributed a paper in which he advocated co-operative advertising by the industry as the foundation, with individual publicity by each of the sections within the industry. In this co-operative advertising there is, he argued, no need for rival utilities to be up and at each other. There is plenty of room for them all in the manifold needs of present-day civilization. In his own Company he has made it a rule never to belittle, or even refer to, the rival gas claims, and, without any arrangement with his gas friends, he has not had occasion to complain of their attitude towards him. The impression that every public utility undertaking should seek to make on the public is that it has something good to sell, and that it is doing its best. One somewhat curious result that is perhaps overlooked is that the advertising of a utility company in particular has a tonic effect on the whole of the staff, and thus produces an improved personal service. It is readily understandable that one is more likely to get live men if the undertaking is itself alive. The whole staff should be inspired with the sense of their duty to give the public service rather than merely to look upon their work as affording a means of livelihood.

Apart from the necessity for advertising through the usual channels, the link between the utility undertaking and the public must be as perfect as possible. The servant of the undertaking who comes in contact with the public has the reputation of the undertaking in his keeping—whether he be the railway servant, the sales engineer, the wireman, or the gas-meter reader. It is in its own interest that a utility undertaking should encourage the whole of its staff to give good service and to secure the goodwill of the public. In these days one cannot get away from the fact that even the servants of a public utility undertaking are encouraged to work with enthusiasm if they know that extra care, foresight, or enterprise will bring a tangible reward, and in theory some form of profit-sharing or bonus for the whole of the staff who can secure business is desirable, though very difficult to devise. But the enthusiasm of the selling staff, particularly if they are encouraged by a bonus system, may be discounted by lack of sympathy on the part of the indoor staff who are responsible for the routine work, though they do not participate in the bonus. It is, of course, important that members of the staff, particularly those who come in contact with the public, should themselves be users of the apparatus and the energy which they wish others to buy and use.

The most wonderful thing, and the greatest possible asset, which a public utility can enjoy is to have an understanding and a favourable public opinion. This is a matter which has not been fully appreciated in this country, and therefore has not been properly sought after by utility undertakings. Public opinion is a difficult thing to mould, and when one has got it in the right shape it is just as difficult to keep it there; but the foundation for a good public opinion must be understanding. The purpose of public utility advertising must surely be to press its claim and the value of its service upon those it serves, to make itself known and to encourage its adoption by those it is in a position to serve, and to create public goodwill. The management must have vision and enterprise, and every employee connected with the undertaking should have enthusiasm in the utility service with which he is associated, confidence in the value of its public service, and conviction in the future prosperity of the industry.

The CHAIRMAN agreed that the attitude of a company's employees towards the customers is exceedingly important.

Mr. YOUNG advocated the multiplication as far as possible of the number of points of contact between undertakings and their customers.

A DELEGATE declared that if the gas and electrical co-operative Publicity Associations had twice as much money, the industries would get four times as much good out of it.

Mr. ROBERTS inquired whether monthly accounts are found to possess an advertising value.

Mr. B. J. MULLANEY (Chicago) said that, speaking of his own particular undertaking—the People's Gas Light Company of Chicago—he doubted whether the matter of advertising value in rendering accounts monthly has ever had consideration. The main object in adopting this system had been to get the money in. The Company figure that every day they can lop off the outstanding accounts in their books is so much gain.

Mr. ROBERTS suggested that the fact of the monthly bills being so much smaller than quarterly ones might induce many more people to go to the gas office and pay cash, instead of forwarding cheques. This would bring the consumers into closer contact with the undertaking.

Mr. GOODENOUGH, referring to the author's statement that "the impression that every public utility undertaking should seek to make on the public is that it has something good to sell, and that it is doing its best," said it is not sufficient to be doing your best unless your best is the best. The undertaking must not only give the impression that it is doing its best, but that this best is the best that can be done.

Mr. J. W. BEAUCHAMP (British Electrical Development Association) said they could well afford to keep more salespeople, and would then be able to put into practice Mr. Goodenough's excellent advice to substitute interviews for letters. He was in favour of salaries, *plus* some form of commission or bonus; and while admitting that with municipal concerns the arrangement of a bonus presents somewhat more difficulty, he thought the system should be explored.

SHAPING CUSTOMER OPINION.

Mr. M. C. ROBBINS (Publisher of the American "Gas Age Record") contributed the next paper, in which he said that, like many other good things, it often happens that advertising is used least by those industries that need it most. In the industries that are basic, and that constitute the very foundation of civilization, it frequently occurs that the executives in charge assume that the service is best offered on a come-and-get-it basis, instead of being merchandized. This was particularly true until recent

years in the case of our public utilities. It is clear that the utilities are among the most important things that enter our lives. Without them we could not live in cities, and without cities to-day's civilization would be as dead as Marley's ghost. There is no story of essential service to the public that in any way measures up to the story of the utilities, and yet we are only now reaching a time when the average citizen is commencing to recognize the truth about the close relationship of the public service corporations to his intimate life. It is not surprising that a feeling of animosity toward the utilities should have developed in the public mind in the years past. The general run of utilities are monopolies, and until recent times they were directed by people who recognized no obligation to divulge the secret of their business.

Fortunately now we have entered a new era—a time of clearer understanding. The public have come to know that the interest of the individual citizen and the interest of the utilities are one; and, on their part, the managers of the utilities have undergone a change of heart, and have developed a new outlook in the matter of increased responsibility, and the possibilities of greater service. Among other things, the managers recognize that nothing is more beneficial than the execution of some plan which will convert a large percentage of the customers into owners of the company's stock. But it remains a fact that, though the utilities have awakened to the needs of the day, and are making rapid progress in educational work, the opportunities for effective advertising are virgin in character. In any line of industry the cost of advertising is just as legitimate an operating expense as the cost of coal or labour, and the public service corporation is no exception. Nothing less than organized, intelligent publicity by qualified advertising specialists can be trusted to tell the utility story. Utility advertising must cover the entire field of public service activities. The important thread running through all educational work should be the truth that the rendering of justice by the citizen to the utilities will result in wide-reaching benefits to the people collectively and individually.

The needs of the moment are many and varied. For one thing, we must change from small sales and high prices, wherever possible, to large sales, low prices, and small profits per customer. We must demonstrate good works rather than advertise good intentions. We must bring the people to recognize the actual value of so-called intangible benefits. For instance, the universal use of gas would reduce by half the fire loss of any people. In America, this saving would amount approximately to $250,000,000 annually. We must urge that our high schools and universities shall have courses enabling the study of public utility problems. We must set forth the truth that private operation coupled with customer ownership provides the safest and most certain check to the activities of dangerous communists and socialists.

The work of advertising the utilities and their service has hardly more than commenced. American public service corporations are now spending from one-quarter to one-third of one per cent. of their gross income for advertising and publicity. In other words, their annual expenditure for selling securities, building goodwill, &c., now amounts to something more than $12,000,000. In well-ordered private business the minimum expenditure for advertising amounts to about 2 p.ct. and the maximum runs as high as 8 p.ct. If the utilities were to spend as much as the minimum set aside by private business for advertising, their expenditure for this purpose would be $80,000,000, instead of $12,000,000.

The fact is that many of the revolutionary developments that will occur during the next few years in the realm of science and industry will take place in the fields occupied by the utilities. Notwithstanding the wide use of electricity in the United States, only two-fifths of the homes are lighted by this means. People talk of there being too much illumination. There may be too much glare, but surely there is not too much light. The light intensity outdoors at noon on a clear day in June averages about 9600 foot-candles, while the average light intensity at night-time in most workshops seldom exceeds 6 foot-candles. In other words, the human eye is quite comfortable outdoors with a light intensity more than a thousand times as great as is generally used by people in the evening when they read or work at home or in an office. In practically every utility field at the present time there is a chance for progressive management to sell many times as much service to the average citizen as he now uses. The future possibilities of the products of the utilities are beyond estimation. Not even the most active imagination can comprehend the character of the life of to-morrow, in view of the ever-increasing number of inventions and the rapid expansion of technical knowledge. More than ever in years just ahead the service of the utilities will represent the basis of human activities. All this clearly indicates how essential it is for us to prepare the way through highly-developed campaigns of publicity and advertising for radical change in the rendering of public service.

Municipal v. Private Ownership of Public Utilities.

Mr. Bernard J. Mullaney (Vice-President of the People's Gas Light and Coke Company of Chicago), in a thoughtful address, discussed, from the American standpoint, an important question. His argument was that private ownership is better than municipal or any other form of government ownership, because it works better. The statement is as axiomatically true as it is to say that a government of law is better than a state of anarchy; it is warranted by the facts of experience. He set out fifteen reasons for this view. Two of these reasons as applying to America are given in his own words. "Government ownership of public utilities is—and this is not just a figure of speech—hostile to the very spirit of the United States and its institutions. It is foreign to the normal, every-day habits of thought and action among a prosperous, progressive, enterprising people. In its origin, our country is a product of individual initiative, enterprise, and aspiration; read it in the lives of Columbus, the Cabots, Capt. John Smith, the Virginia Cavaliers, and the Pilgrim Fathers. It is the same in all details of its growth and development; read that in the lives of the founders and builders of the Republic, from Washington and Jefferson down to the present day.

"Public utility service as a whole—electric light and power, transportation, communication, and gas—is, speaking broadly, more highly developed in the United States than anywhere else on earth that I know of, and largely because it has been so little under the dead hand of municipal ownership. There is, in the United States, more utility service (gas, electric, telephone, and transportation considered as a whole) of better quality than anywhere else; and it is accessible to, and usable by, a greater proportion of the population at lower average rates than anywhere else—all of it the product of individual initiative and enterprise under private ownership and management.

"This reasoning is not vitiated by examples of apparently successful government ownership elsewhere. Analysis of those examples will disclose: First, that they are free from domination by 'practical politics' to a degree unattainable in the United States, and their operating conditions are, therefore, more like those of private management; secondly, that their managers enjoy an amplitude of power and authority—autocratic authority, by United States standards—which would not be tolerated there, and could not be, without radical change in governmental practice and fundamental law."

Concluding Business.

The session was brought to a close by two papers on "Railway Advertising," the authors of which were Mr. Ivor Fraser and Mr. W. M. Teasdale. Mr. Fraser concluded his remarks by stating that public utilities live on public goodwill more than anything. There is a distinction between selling a thing and filling a service; yet the two must be linked-up. Only by the closest co-operation between those supplying the service and those presenting it can a public utility advertising campaign win out. Failure in this direction means failure to harness the greatest weapon in developing business—advertising.

Mr. Goodenough pointed out that there are in this country examples of municipally-owned gas and electricity undertakings that would not by any means bear out all Mr. Mullaney had said about municipal ownership. He then moved as a resolution (to be sent to public utility undertakings) the following statement of policy, outlined by him in his opening address:

That this conference is of opinion:

(1) That it is as important to advertise the services which public utilities can render to the community as it is to advertise the goods of firms which have no monopoly rights of supply.
(2) That goodwill, based upon equitable policy and "service-first" principles, is essential to the permanent prosperity and persistent progress of public utility undertakings.
(3) That advertising is essential to the establishment and maintenance of such goodwill.
(4) That fully educated, efficient salesmen are equally essential.
(5) That the possession of a monopoly, whether by a company or a municipality, imposes on its administrators the duty of a policy of progressive business methods, in the interests of consumers, as well as of stockholders or ratepayers.

He thought this needed no words of his to support it, after the discussions they had had.

Mr. Beauchamp seconded, expressing strong approval of the idea of sending the resolution round to the public utilities. A public utility, he added, can only complete its work when every individual in the community is using its commodity. He felt that the conference organized by Mr. Goodenough would do a tremendous amount of good.

The motion was unanimously agreed to, and votes of thanks were passed to the authors of the papers and to the Chairmen of the two sessions.

COMPANY OWNERSHIP AND OPERATION UNDER PUBLIC CONTROL.

By Jacques Abady, Barrister-at-Law.

[A Paper submitted to the Public Utilities Section of the International Advertising Convention at Wembley, July 15, 1924.]

One of the most difficult questions in connection with modern developments is the provision and regulation of public utility services. By this is meant the supply of electricity, gas, and water. The essential difficulty arises from the fact that these services are in the nature of a monopoly—that is to say, they are necessarily non-competitive. It is in fact a political question which agitates the public from time to time whether in these circumstances it is in the general interest that the services should be undertaken as a whole by the State or, in respect of any district, by the local authority thereof, or, in respect of any district, by a company. It

is not the purpose of this paper to enter in any way upon a political discussion as to the relative merits of these respective views. It may be permissible to point out, however, that those who are opposed to State or municipal (that is to say, local) management of these undertakings base their opposition upon the theory that such control does not lead to the necessary enterprise and vitality which ought to be associated with a progressive management of a public utility.

In England, a series of General Acts are in force; and it is the purpose of this paper to explain how these Acts serve to control the management of public utilities when in the hands of a company. The legislative practice in England with respect to water does not arise, to any great extent, in this connection, while the position with respect to electricity is, it must be admitted by the most ardent admirer of the institutions of this country, in an unsatisfactory state. This fact rather calls for the comment that the legislation with reference to electricity is modern (dating from 1882), but has nevertheless been found to be singularly ineffective and detrimental to the progress of electricity supply. For these reasons it is proposed to illustrate the position by reference to the legislation relating to gas supply, and to explain how this has been designed to protect the public in respect of the right to a supply, the quality of the supply, the price of the supply, and the limitation of profit in connection with the giving of the supply.

In this country (it should be premised) statutory authority is necessary in order to give a gas supply to the public. The reason is because without such authority it is not practicable or possible to break up the streets and to interfere with the general public rights, and, of course, unless this is done a supply cannot in fact be given.

When, therefore, either a local body or a company desire to build a gas-works and distribute gas, they must obtain an Act of Parliament or a Special Order having the equivalent effect. Such an Act or Order incorporates the Gas-Works Clauses Acts of 1847 and 1871, and the parliamentary authorities also insist upon the inclusion in the Act or Order of certain standard or model clauses founded upon experience and (in some cases) in accordance with the Standing Orders of Parliament. The effect of this incorporation is to provide for the protection of the public in the matters above referred to in the following way:

The Right to a Supply.

A gas company is placed under an obligation, by section 11 of the Gas-Works Clauses Act, 1871, to supply gas to the owner or occupier of any premises situated within 25 yards from any main, and the section limits and defines the charges (if any) which the company may make for effecting the connection, and the security which in certain cases may be demanded. It should be said that, generally speaking, the only charge that can be made is the cost of the pipe (if any) laid upon the property itself, and that if the premises are in a town close to a main, no question of any other charge or security arises. This obligation has been modified by a model clause so as to prevent an unreasonable demand being put upon a gas company where, for instance, a very large quantity of gas might be required for an industrial use quite in excess of the capacity of the mains and services. It will be seen, therefore, that the creation of a monopoly to supply gas in a district is coupled with the obligation to furnish it; and it must be understood that where an obligation exists, the Acts provide for substantial penalties for a breach thereof.

The Quality of the Supply.

Every gas company or authority are under an obligation to supply gas of a certain quality and at a certain pressure. Until about the year 1914 the measurement of quality was the illuminating power tested by standard or approved methods and in accordance with technical details and regulations, which it is unnecessary to do more than mention. From that time onward it became a custom to substitute for illuminating power a standard of calorific power, or heating value, so that the obligation became one of supplying a cubic foot of gas containing so many heat units. In other words, each cubic foot had to have a certain calorific value expressed in heat units, and, generally speaking, this was about 500 B.Th.U. In 1920 the Gas Regulation Act was passed, and under it the obligation to charge for heat units and not for cubic feet was imposed in certain cases. When the scope of the operation of the Act is complete, all gas will be charged by the heat content, and not by the cubic foot. The effect is to enable a gas undertaker to adjust the working and manufacture of gas, so as to keep pace with any improved methods, notwithstanding that such adjustment may mean the output of gas of a different quality to that supplied hitherto. The consumer always gets his value, because he pays for each therm he consumes. The Act also gives an important relief to gas undertakings, by enabling them to declare the calorific value to be supplied, and to alter this from time to time after due notice to the consumers.

The thermal standard which the Act sets up is called a therm, and consists of 100,000 B.Th.U. Put in another way, where the declared calorific value is 500 B.Th.U., a therm equals 200 c.ft. of gas, each c.ft. of which contains 500 B.Th.U., and generally speaking, for comparison, the charge for a therm is one-fifth of the charge for 1000 c.ft., which was the old basis of charge. As regards pressure, the obligation with respect to minimum pressure has, generally speaking, been increased to about 2 inches. The Gas Regulation Act greatly enlarges the powers and duties of a body termed the Gas Referees, who are charged with the duties of specifying the method of testing gas so as to see that it accords with the statutory standards of quality, pressure, and purity, prescribing the apparatus to be used for these purposes; superintending the organization relative to the appointment and duties of gas examiners; and enforcing or seeing to the enforcement of penalties for breaches. It should be added that all gas has to be free from ammonia and sulphuretted hydrogen. The price of the supply must be considered in relation to:

Limitation of Profit.

In most Acts or Orders regulating a gas company a standard price per 1000 c.ft. or per therm is fixed, and this standard price is what forms the basis of the charge to the ordinary consumer. If a consumer requires gas for industrial purposes or heating or power, a company may charge lower prices, provided the charge is the same to all consumers for the like purpose in similar circumstances. The standard price, in fact, is a maximum price; but as is explained below, it may be exceeded in certain circumstances which a system called the sliding-scale induces a company to try to avoid. The sliding-scale was introduced in the early seventies—on the suggestion of the gas industry itself—and replaced a system of regulated maximum price and fixed dividend which still applies to some companies. The sliding-scale is the device whereby the standard dividend to the shareholders (which is also fixed by the Act of Parliament) varies, or may vary, inversely as the price of gas to the ordinary consumer. In other words, if the standard price is exceeded, the company can only distribute a lower dividend, while if the standard price is not reached, the company may distribute a larger dividend. Giving a concrete example, which is very general, suppose the standard dividend is 5 p.ct. and the standard price is 5s. per 1000 c.ft. (1s. per therm). Then for every 1d. per 1000 c.ft. (0·2d. per therm) by which the charge to the ordinary consumer is reduced, the shareholders may distribute 2s. 6d. p.ct. extra dividend; while if the price is higher than the standard price, the dividend must be reduced proportionately in the same ratio. Loan capital at a fixed rate of interest is not subject to the sliding-scale; and in order to secure that the inducement to good management may be effective, a limit is placed upon the proportion of capital which may be raised by a company as loan capital.

It will be seen that by these simple means an incentive is given to a company to manage their concern with such ability, forethought, enterprise, and economy as to enable them to reduce their charges for gas, while a penalty is placed upon the company if the charges are high. It may be stated that, as a rule, the consumers' benefit—*i.e.*, the benefit of a reduction of 1d. per 1000 c.ft. (0·2d. per therm) is from seven to ten times the shareholders' benefit of an increment in dividend of 2s. 6d. p.ct. per annum. Under the Gas Regulation Act the standard price fixed in relation to pre-war circumstances can be adjusted so as to allow for increased costs due to altered world conditions, and means are provided whereby the standard price may be modified, if circumstances render it unfair to either the consumers or the shareholders. It should be added that, in consequence of the operation of the sliding-scale, and despite some patchwork remedial legislation, the gas industry suffered severely during the war and until the Gas Regulation Act enabled the obsolete standard prices to be adjusted. During the war, the gas industry, perhaps alone of all industries, suffered severe financial deprivation. The Gas Regulation Act has remedied the position.

It should be remembered that gas companies sell products other than gas—namely, coke, tar, ammonium sulphate, and tar derivatives. Inquiry may arise as to why the dividend is not regulated by the price of these commodities. The answer is that none of these commodities is the subject of the monopoly. Each is sold in competition in the open market. The gas sold, however, is not subject to competition, because competing companies or authorities in an area are not permitted. It is therefore by the price of the monopoly that the dividend is regulated. It should be added that this system has worked very well indeed, and is now the subject of imitation in other industries, modified so as to be suitable to the circumstances of each industry. An example of this adaptation is to be found in the Bills now before Parliament relating to the supply of electricity in London. In order that there can be no evasion of the sliding-scale arrangement, the amounts out of revenue which a company may place in any one year to reserve, depreciation, carry forward, &c., are limited by the Act of each company.

In conclusion, it is submitted that the legislation above described with respect to gas-works in England, comparatively old-fashioned as it is, has worked so simply and well that it answers the political and economic objections which have been raised from time to time with respect to the so-called monopoly of public utilities, and, it should be added, has proved elastic enough to be capable of adaptation so as to include the element of the workman's share under profit-sharing schemes as part of the sliding-scale system. This is another characteristic of legislation with respect to gas companies in England, who may be said to be the pioneers of profit sharing. In fine, it is submitted that the simple expedient of the sliding-scale brings about a true partnership between consumer, producer, and workman.

Society of British Gas Industries.—Acknowledgment is made of the receipt from the Secretary (Mr. Arthur L. Griffith) of a copy of the rules, list of members, and officers and Committees for 1924-25 of the Society of British Gas Industries.

CITY AND GUILDS OF LONDON INSTITUTE PASS LIST.

Successful Candidates in Gas Engineering, Gas Supply, and Gasfitting Examinations.

WE have received from Mr. W. T. Dunn, the Secretary of the Institution of Gas Engineers, a list of successful candidates in the last examinations in Gas Engineering, Gas Supply, and Gasfitting, which has been forwarded to him by the Superintendent of the Department of Technology of the Institute. The questions set will be found in the "JOURNAL" for May 14 and 21, pp. 480 and 547.

GAS ENGINEERING—FINAL EXAMINATION.

FIRST CLASS.

Candidate's Name, Address, and Age.	Examination Centre.
Miles, Sidney H., 33, Freshwater Road, Reading (24)	Reading
Chambers, John W., 13, Ward Street, Derby (19)	Derby
Hill, Arthur D., 45, Arthur Street, Derby (20)	Do.
Quiller, Wilfrid R., 11, St. Jude's Place, Plymouth (19)	Plymouth
Lane, Ivor J., 44, Dyfodwg Street, Treorchy, Rhondda (24)	Treforest
Cottrell, Albert F., 114, Brynland Avenue, Bishopston, Bristol (21)	Bristol
Gee, Francis H., 45, Gainsborough Road, Crewe (28)	Manchester
Farmer, John A., 34, Temple Fortune Lane, Golders Green, N.W. 11 (23)	The Polytechnic, Regent St., W. 1
Sanders, Frederick A., 54, Ilderton Road, S.E. 16 (26)	Do.
Roberts, John, 10, Binns Street, Bingley, Yorks (20)	Bradford
Jackson, John C., 14, Grafton Place, Ovenden, Halifax (24)	Halifax
Smalley, Arthur, 1, South View, Fryston, Castleford (25)	Leeds
Melvin, Duncan D., 34, Wardlaw Avenue, Rutherglen (24)	Glasgow
Thomas, Ivor W., The Wern, Gnoll Park Road, Neath (23)	Neath
Edwards, Edward M., Maes-y-Berllan, Duffryn, Onllwyn, Neath (21)	Do.
Jones, Cecil B., "St. Margaret's," Smithard's Lane, Cowes, I. of W. (20)	Newport, I. of W.

SECOND CLASS.

Candidate's Name, Address, and Age.	Examination Centre.
Bettle, Philip R., 61, Wilmot St., Derby (24)	Derby
Aspinwall, Reginald, Church Gate, Brideston, Devon (28)	Plymouth
Lambert, Edward, 44, Winsor Terrace, Beckton, East Ham, E. 6 (28)	East Ham
Giles, Alexander C., 95, Sutton Court Road, Plaistow, E. 13 (20)	Do.
Whittenbury, John H., "St. Edmund," Longbridge Road, Barking (20)	Do.
Ashman, William L., 4, Coronation Rd., Bath (19)	Bristol
Copp, Arthur D. L., 7, Beechen Cliff Road, Bath (24)	Do.
Gunston, George Cecil, School House, Long Ashton, Bristol (23)	Do.
Haynes, Cedric G., 23, Badminton Road, Lower Ashley Road, Bristol (32)	Do.
Lawrence, Adalbert P. C., "Thorne Holme," Oldfield Park, Bath (24)	Do.
Merchant, Douglas J., 64, Newbridge Road, Bath (22)	Do.
Miell, Leopold L., 34, Gay St., Bath (31)	Do.
Spencer, John T., Rock House, The Splots, Milton, Weston-super-Mare (31)	Do.
Newing, George W., Sparrow Farm, Acol, near Birchington (18½)	Ramsgate
Ogden, George, 38, Queen's Park Road, Blackburn (30)	Blackburn
Blythe, Harry, 1, Hugo Lane, Gt. Harwood, Lancs. (25)	Burnley
Greenwood, Irving, 57, Larch Street, Nelson, Lancs. (27)	Do.
Wright, Stewart L., 38, Milton Road, Birkenhead (22)	Liverpool
Saunders, Alfred G., 38, Picton Avenue, Runcorn, Cheshire (22)	Do.
Newton, George, 84, Wicken Tree Lane, Failsworth, near Manchester (24)	Manchester
Broomhead, Harry, 1, Greenfield Road, West Bollington, Macclesfield (24)	Do.
Johnson, Charles, 4, Woringworth, Dean Avenue, Newton Heath, Manchester (21)	Do.
Pye, James W., 4, Woringworth, Dean Lane, Newton Heath, Manchester (24½)	Do.
Jackson, John A., 167, Westbourne Avenue, Bolton, Lancs. (22)	Do.
Hill, John, Gas-Works, Sandbach (18)	Do.
Wilson, Augustus G., Nashdom, Barnfield, Urmston, Manchester (25)	Do.

SECOND CLASS—(*Continued*).

Candidate's Name, Address, and Age.	Examination Centre.
James, Cyril, 187, Claremont Road, Penton, Manchester (20)	Manchester
Ashton, Frank, 15, Brown Street, Middleton, Manchester (31)	Do.
Kearns, Harold, 1, Engineer Street, Higher Ince, Wigan (26)	Wigan
Allen, Albert, 42, Ormskirk Road, Up Holland, near Wigan (21)	Do.
Jubb, Arthur R., The Lodge, 93, Mere Road, Leicester (22)	Leicester
Holloway, Leonard R. C., 64, Upper Brockley Road, Brockley, S.E. 4 (29)	L.C.C. Westminster Technical Inst.
Afford, Howard, 27, Handen Rd., Lee, S.E. 12 (21)	The Polytechnic, Regent Street
Challice, Harold E., 168, Earlsfield Road, Wandsworth, S W. 18 (21)	Do.
Clarke, Neville V., 81, Amesbury Avenue, Streatham, S.W. 2 (24)	Do.
Dawkins, Bernard W., "Lindisfarne," South Hill Avenue, Harrow (19)	Do.
Ellis, George W., 288, High Street, Berkhamsted, Herts (24)	Do.
Fry, Percival G. S., 28, Teviot Street, Poplar, E. 14 (20)	Do.
Godwin, Claude V., 139, Hornsey Park Road, Hornsey, N. 8 (21)	Do.
Holdway, Sydney, c/o Gas Light and Coke Co., Fulham Gas-Works, S.W. 6 (34)	Do.
Palmer, Albert E., 14, Ampton Street, Grays Inn Road, W.C. 1 (27)	Do.
Pepper, Richard, J., 17, Paddington Green, W. 2 (19)	Do.
Ridgway, Harold J., 119, Barry Road, East Dulwich, S.E. 22 (27)	Do.
Risby, Harry J., 129, Asylum Road, Peckham, S.E. 15 (25)	Do.
Seabrook, John A., 9, Southcourt Avenue, Linslade, Leighton Buzzard (20)	Do.
Storey, William, "Grin," Stone Grove, Edgware, Middlesex (22)	Do.
Summerson, Jackson, 65, Naseby Road, Luton, Beds. (20)	Do.
Walker, Maurice, 9, Cascade Avenue, Muswell Hill, N. 10 (21)	Do.
Whimster, Thomas C., 270, Wightman Road, Hornsey, N. 8 (24)	Do.
Wolfe, Thomas A., 7, Castle Street, Hertford, Herts. (30)	Do.
Grimwood, Charles E., Gas-Works, Colchester (21)	Ipswich
Ware, Gilbert C. J., c/o Engineer's Office, Redhill Gas-Works (20)	Redhill
Skinner, Alex. G., 46, Priory Road, South Park, Reigate, Surrey (21)	Do.
Saunders, Rupert, H., 43, Upper High Street, Worthing (19)	Brighton
Brown, James T., 216, Summerville Road, Small Heath, Birmingham (19)	Birmingham
Jones, Sydney B., "The Homelands," Stone Lane, Kinver, near Stonebridge (23)	Do.
Minshaw, Arthur, 46, Woodfield Road, Kings Heath, Birmingham (26)	Do.
Perry, William H., 109, Kent Street, Upper Gornal, Dudley (20)	Do.
Wainwright, Jack H., Albert House, Princes End, Tipton, Staffs.	Do.
Ward, Denis J., 20, Noel Road, Edgbaston (21)	Do.
Taylor, Joseph R., 41, Mount Pleasant Street, Coseley, near Bilston, Staffs. (21)	Do.
White, George, Cringles, Silsden, near Keighley (21)	Keighley
Cowling, William, 9, Cragg View, Banklands, Silsden (27)	Do.
Mills, Thomas W., c/o 83, High Street, Wombwell, near Barnsley (22)	Barnsley
Cowley, Leonard R., Gas-Works, Shipley, Yorks. (23)	Bradford
Bottomley, Harold, 7, Emscote Place, Halifax (26)	Halifax
Telford, Frank, 8, Spark Street, Longwood, Huddersfield (21)	Huddersfield
Alexander, Anthony P., 19, Hampden Street, South Bank, Yorks. (27)	Middlesbrough
Goldthorpe, Eric T., 35, Briar Road, Nether Edge, Sheffield (17)	Sheffield
Parry, Thomas E., 22, Newsham Road, Meersbrook, Sheffield (20)	Do. (University)
Rawnsley, William E., 27, Cavendish Road, Guiseley, near Leeds (23)	Leeds

SECOND CLASS—(*Continued*).

Candidate's Name, Address, and Age.	Examination Centre.
Lewis, Thomas G., "Fernlea," 16, Noster Hill, Beeston, Leeds (22)	Leeds
Simpson, Arnold, 2, Shafton View, Holbeck (22)	Do.
Brush, Arthur S. W. M., 89, Main Street, Spittal, Berwick-on-Tweed (24)	Edinburgh
Jamieson, Alexander, Patterton, Thornliebank (22)	Glasgow
Rowan, Thomas A., 12, Sinclair Street, Helensburgh (28)	Do.
Greig, John C., 94, North Frederick Street, Glasgow (22)	Do.
M'Gown, Samuel, 9, Skaithorne Road, Maryhill (22)	Do.
M'Dougall, William, 73, Wellshot Road, Shettleston, Glasgow (28)	Do.
Baker, William J., 48, Thanet Road, Margate (24)	Margate
Hammond, Stanley W., "Gas-Works House," Gas-Works, Eastbourne (25)	Eastbourne
Bointon, Ernest, 45, Candler Street, Scarborough (24)	Scarborough

GAS SUPPLY.—FINAL EXAMINATION.

FIRST CLASS.

Candidate's Name and Age.	Centre.
Wright, Stewart, L. (22)	Liverpool
Bowler, Percy J. (20)	L.C.C. Westminster Technical Inst.
Young, Sydney (32)	Do.
Thear, Charles F. (28)	Do.
Hill, William H. (40)	Do.
Dann, Arthur F. (18)	Gt. Yarmouth
Hepple, John R. (40)	Newcastle-on-Tyne
Heron, Arthur T. (38)	Do.
Mitchell, James, M.A. (36)	Do.
Jones, Sidney B. (23)	Birmingham
Perry, William H. (20)	Do.
Shorrock, James N. (26)	Do.
Terry, Charles D. (24)	Do.
Wainwright, Jack H. (22)	Do.
M'Lusky, James M. (21)	Keighley
White, George (21)	Do.
Cowling, William (27)	Do.
Melvin, Duncan D. (24)	Glasgow
Jamieson, Alexander (22)	Do.
Wood, Charles C. (21)	Wellingborough
Thomas, Ivor W. (23)	Neath
Barrow, Walter C. (27)	Warrington
Broomhead, Harry (24)	Manchester

SECOND CLASS.

Candidate's Name and Age.	Centre.
Corbin, Arthur C. S. (25)	Exeter
Parrett, Jack (23)	Do.
Jones, Herbert (27)	East Ham
Cobb, Frederick H. (31)	Do.
Randell, George W. (37)	Cardiff
Smith, Thomas (30)	Do.
Bull, Frank H. C. (28)	Bristol
Kiddle, William (23)	Bournemouth
Ogden, George (30)	Blackburn
Gould, William H. (30)	Burnley
Newton, George (24)	Manchester
Kay, Thomas (40)	Do.
Johnston, Charles A. (25)	Do.
James, Charles H. (20)	L.C.C. Westminster Technical Inst.
Graham, Frederick (25)	Do.
Pepper, Richard J. (19)	Do.
Horsfall, Albert V. (—)	Do.
Saunders, Fred G. (30)	Do.
Collins, Edwin (27)	Do.
M'Quire, Oswald E. (35)	Do.
Glayzer, Hubert C. (29)	Do.
Gibbins, Reginald E. (21)	Do.
Chapman, William V. (29)	Do.
Marshall, Cyril C. B. (—)	Do.
Turner, Leonard C. (18)	Do.
King, William V. (19)	Do.
Dawling, Alfred R. (24)	Do.
Mann, William J. (18)	Do.
Steer, John F. (26)	Do.
Harris, Edward S. (22)	Do.
Wright, Albert E. (21)	Do.
Fowler, Sidney G. (19)	Do.
Anderson, Thomas W. (21)	Do.
Tutt, George T. (29)	Do.
Chalk, Walter A. (26)	Do.
Lewis, Maximilian (26)	Do.
Southwick, John (28)	Do.

SECOND CLASS—(*Continued*).

Candidate's Name and Age.	Centre.
Wood, William S. (30)	L.C.C. Westminster Technical Inst.
Choppen, William A. (40)	Do.
Davey, Edward F. (30)	Do.
Ford, Edmund C. (29)	Do.
Jefferies, John K. (31)	Do.
Jones, Arthur A. (24)	Do.
Gardiner, Stanley F. (17)	Great Yarmouth
Henderson, William (24)	Newcastle-on-Tyne
Johnson, Ernest R. (33)	Do.
Mitchell, Bertram (50)	Do.
Goldsmith, James H. (22)	Croydon
Skinner, Alec. G. (21)	Redhill
Brown, James T. (19)	Birmingham
Bishop, Charles T. (25)	Do.
Hammersley, Frank N. (19)	Do.
Moreton, Gordon L. (22)	Do.
Whitney, Albert A. (30)	Doncaster
Brogan, Richard (29)	Bradford
Cowley, Leonard R. (23)	Do.
Sykes, Harry (33)	Do.
Bottomley, Harold (26)	Halifax
Higham, Arthur L. (22)	Hull
Simpson, Alwin G. (26)	Edinburgh
Phairn, William (25)	Glasgow
Miller, William (24)	Do.
Edwards, Edward M. (21)	Neath
Warrington, Priestley (32)	Huddersfield
Beaumont, Arthur (19)	Do.
Greenwood, Irving (27)	Burnley
Griffiths, Edward (24)	Do.
Riley, James (30)	Do.

GAS FITTING.—FINAL EXAMINATION.

Name.	Class of Success.	Examination Centre.
Rendell, George Thomas	1st.	Bournemouth
Kiddle, William	2nd.	Do.
Hill, Leonard Charles	1st.	Do.
Woodhall, Albert	2nd.	West Bromwich
Skeggs, Arthur William	1st.	Redhill
Bodsworth, Henry	1st.	Birmingham
Clamp, Percy Reginald	1st.	Do.
Gibson, James Henry	1st.	Do.
Purshouse, Thomas	1st.	Do.
Wickham, George Ferdinand	1st.	Do.
Salway, Bert	1st.	Cardiff
Smith, Thomas.	1st.	Do.
Steer, John Frederick	1st.	London, Westminster Tech. Inst.
Markham, James	1st.	Do.
Young, Walter George	1st.	Do.

A VISIT TO BECKTON.

On the invitation of the Governor and Court of Directors of the Gas Light and Coke Company, representatives of the scientific side of education at the Universities of Oxford, Cambridge, and London (including the Imperial College of Science and Technology) paid a visit to Beckton on Tuesday, the 15th inst.

The guests assembled at the Beckton War Memorial, where they were welcomed by the Governor (Mr. D. Milne Watson) and Messrs. Hartley and Goulden (Directors), and proceeded to make a tour of the works accompanied by the Chief Engineer, Assistant General Manager and Secretary, Chief Gas Chemist, and Messrs. E. J. Hutchence, S. Hay, and W. G. Adam. After inspecting both piers, the party proceeded to No. 2 retort-house, and then to the oil-gas plant.

At lunch the Governor, after proposing the toast of "The King," welcomed the guests to Beckton, and expressed the wish that, through their efforts, the union between science and industry, especially the gas industry, might become even closer than it was already. Profs. Bone and Thorpe, both of the Imperial College of Science and Technology, thanked the Governor and Directors for their kind hospitality, and for all they had seen.

After lunch the party inspected the new workshops, and then paid a long detailed visit to the products works. They reassembled for tea at Beckton, when Prof. Smithells once more thanked the Governor and Directors for their kindness.

The names of the guests present were: Prof. C. F. Jenkins, C.B.E., M.A. (Professor of Engineering, Brazenose, Oxford); Dr. C. G. Douglas, C.M.G., F.R.S. (Natural Science, Oxford); Prof. J. F. Thorpe, C.B.E., D.Sc., Ph.D., F.R.S. (Organic Chemistry, Imperial College); Prof. W. A. Bone, D.Sc., Ph.D., F.R.S. (Chemical Technology, Imperial College); Prof. A. J. Allmand, M.C., D.Sc., F.I.C. (Professor of Chemistry, King's College, Strand); Prof. A. Fowler, A.R.C.S., F.R.A.S., F.R.S. (Astrophysics, Imperial College); Prof. A. Smithells, C.M.G., F.R.S., D.Sc., F.I.C.; Mr. H. J. Crawford, B.A. (Secretary of Appointments Board, University of London); and Capt. Davidson Pratt (Chemical Warfare Committee).

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Misappropriation of Gas Profits.

SIR,—Manchester began it! And for a hundred years the hub of the Free Trade Movement pursued the anomalous folly of taxing the one trade of which, in its corporate capacity, it had the control. The tax ran to about £50,000 per annum for fifty years, and was a levy upon trade in its every aspect—labour, food, clothing, housing; light, heat, and power; sanitation, in all its beneficence; cleanliness, quiet, health, education, art, and æsthetics. And if the tax was upon all things estimable and desirable, it was perforce a premium upon things offensive. Why was it continued so long? Who was to benefit? Who, but the property owner, who most distinctly benefited when he lived outside the noisy, smoky, sunless area, and burnt no gas!

After a hundred years, however, light penetrated the Council; and acknowledging their past errors, they applied to Parliament to limit their power to do evil. But the propensity, ingrained by long indulgence, could not be cast off wholly and at once, and so, in answer to their prayer, they were permitted to continue to sin—just a little. Why that little? If gas is the beneficent agent we believe it to be, why not give it full scope, and openly proclaim it to be to the pleasure and profit of everybody to reverse the policy of the past, and succour it out of the funds to which it has hitherto contributed? Instead of taxing it, let it be immune from tax; and instead of subsidizing rates at the cost of gas, reverse the process. Who then will suffer? The singular old gentleman referred to above; and all the rest of the community will gain in many, many ways. The price of gas will be materially lowered, and a low price will beget a lower, and every reduction is a milestone on the road to that ideal hive of industry in which there is no grime, and where the sun shines undimmed upon a healthy, happy populace.

Of all the corporations, which will take the lead in this greatly-needed effort? Lady Godiva "took the tax away," and built herself an everlasting name. I look to Coventry to do homage to her memory.

Mayfield, Llandudno, July 26, 1924. HENRY WOODALL.

Carbonization of Coal in Bulk. (Becker Ovens.)

SIR,—Mr. Marshall's time-honoured joke about the "five legged rabbit" was applied to figures presented either by the Tully Gas Plant Company or the Coalite people, or the amalgamation of the two—I am not quite sure which. But it seems that for super-efficiency the American Becker ovens run the above concerns very close. Just look at the figures published by Messrs. Woodall Duckham in your last number, and check them over by the following:

Basis: 1 ton of dried coal containing 33·60 p.ct. volatile matter.

Products obtained per ton of coal—

(*a*) Coke	0·7575	tons.
Gas, 12,700 c.ft. of usual specific gravity coke-oven gas (0·35 when air = 1)	0·1620	,,
Tar, 11·5 gallons, specific gravity usually 1·2	0·0620	,,
Light oil, 3·76 gallons, specific gravity usually 0·8	0·0135	,,
* Liquor, 28·2 gallons, specific gravity (say) 1	0·1270	,,
Total	1·1220	,,
Charge into ovens	1·0000	,,
Surplus by Becker process	0·1220	,,

or Becker efficiency = 112·2 p.ct.

* Liquor apparently made up from: Original moisture, 5 p.ct.; combined water, about 8 p.ct. by weight.

(*b*) Furnace coke.

Volatile matter in 1 ton of dry coal	0·33600	tons.
Volatile matter in 0·7005 ton of coke, as produced (0·67 p.ct.), per ton of coal	0·00461	,,
Volatile matter expelled from coal	0·33139	,,

Theoretical coke quantity 1·0000 − 0·33139 = 0·66861 ton.

Produced by Becker process (dry basis), 0·6894 ton.

Super-efficiency by Becker process:

$$\frac{0{\cdot}6894 \times 100}{0{\cdot}66861} = 103 \text{ p.ct.}$$

Now, these efficiencies are distinctly good, so good in fact that they ought to be brought to the notice of the various learned bodies set up to look into the possibilities of coal saving and fuel economy in this and other countries.

My wife, who is looking over my shoulder and holds the erroneous belief that she is married to a gas engineer, suddenly exclaims: "Oh, you babe, can't you see that they are aerating the gas and watering the coke!"

Aerating the gas and watering the coke!

Horrible thought, but women are always jumping to conclusions, and have not the real "Becker" sense of proportions.

July 24, 1924. SIMPLE SIMON.

Fireclay Retorts at Keighley.

SIR,—Having been away during last week, I have only just noticed Mr. H. J. C. Johnston's letter upon this subject in your issue of the 9th inst. Mr. Johnston states that the retorts, which I said in the discussion on Mr. Emery's Institution paper were made of siliceous material, were actually made of fireclay without any addition of silica. As the maker of the retorts in question, Mr. Johnston is obviously familiar with their composition; but in alluding to these retorts as "siliceous" I did not necessarily mean that silica had been added to the fireclay in the course of their manufacture. Retorts can surely be described as "siliceous," even if they are made of a natural clay. Does not the term "siliceous" merely indicate that the percentage of silica in the clay is above a certain figure, without, however, exceeding 92 p.ct., above which the material is rightly termed "silica"?

Mr. Johnston, in a letter on the same subject to your contemporary the "Gas World," stated that Mr. Emery refers to the Keighley retorts as "moulded A4 siliceous retorts," which indicates that Mr. Emery is also in doubt on the matter. At the works themselves I was certainly informed that the retorts were of "siliceous" material, as I made a written note of it at the time, and have since referred to it.

The question is, therefore, what is "fireclay," and what is "siliceous" material? In the Institution of Gas Engineers Standard Specification for Refractory Materials for Gas-Works, it is stated that material containing from 80 to 92 p.ct. of silica is called "siliceous." I would, however, respectfully submit that the lower figure is too high, as there is a good deal of refractory material with a lower content of silica than 80 p.ct. that has the general characteristics of "siliceous," and not of "fireclay," material, and such material is therefore out of place if treated as "fireclay."

In a paper which I read before the Ceramic Society at Bournemouth on "The Use of Refractory Materials in Gas-Works," in May, 1923, I ventured to express the opinion that there was great scope for semi-silica or siliceous material having a silica content varying from 76 to 92 p.ct., and in the course of the discussion Mr. Johnston stated that "in giving that wide scope of silica content from 76 to 92 p.ct., I think Mr. Gill has acted very wisely." From which remark I should assume Mr. Johnston considers that on general lines material coming within this range has similar characteristics.

In my experience, I have noticed a marked difference between "fireclay" and "siliceous" retorts, the latter, if well made, remaining level and of good shape when worked at high temperatures, and as these particular retorts were undoubtedly giving excellent service, I, and possibly many others of your readers, would be interested if Mr. Johnston would follow up his previous letter and state the percentage of silica in the retorts in question.

G. M. GILL.

119, Victoria Street, London, S.W. 1., July 23, 1924.

REGISTER OF PATENTS.

Gas Turbines.—No. 211,821.

ERSTE BRÜNNER MASCHINEN FABRIKS GESELLSCHAFT, of Brünn.

No. 15,919; June 19, 1923. Convention date, Feb. 23, 1923.

This invention relates to high-pressure steam or gas turbines which are constructed as disc wheel turbines, and consists in that the guide wheels or nozzle diaphragms are arranged between the rotor wheels of the high-pressure turbine and fitted into one or more elastic supporting cylinders cast in one piece with the cylinder of the turbine. When the guide passages or nozzles are formed by separate blades arranged radially next to each other, the milled separate blades are fixed at one end to the guide wheels, and at the other end are fitted directly, without clearance and in a perfectly pressure-tight manner, in the supporting cylinders, but in such a way as to be capable of being removed.

Gas Turbines.—No. 215,295.

ERSTE BRÜNNER MASCHINEN FABRIKS GESELLSCHAFT, of Brünn.

No. 15,921; June 19, 1923. Convention date, May 5, 1923.

In the known types of steam or gas turbines having a horizontally divided casing the pressure of the driving fluid performing work in the turbine has the tendency to force axial connecting flanges apart and to cause them to gape and become leaky. The object of this invention is to neutralize this effect of the internal pressure and to utilize it for rendering the joints tight. This is effected by the turbine casing being divided at right angles to its axis, and by that part of the casing which is under higher internal pressure, being undivided axially, and that part under lower internal pressure being divided axially. The internal parts, which are also axially divided, are connected only to the rear part of the casing, in such a manner that the pressure exerted by the driving fluid on the axially divided parts in the direction at right angles is greater towards the axis than in the opposite direction. Consequently the axial joints are made tight by internal pressure. The high-pressure part of the turbine casing is made preferably of wrought iron, and the low-pressure part of cast iron.

Manufacture of Coal Gas.—No. 217,969.

ASHLEY, J. T., of Bath, and ALDRIDGE AND RANKEN, LTD., of London

No. 7865; March 19, 1923.

This invention relates to apparatus for the manufacture of coal gas in which the gas passes from a group of retorts through valve-controlled branch connections into a stand pipe down which ammoniacal liquor descends in a spray. The objects of the invention are to provide an improved arrangement of valve in the stand pipe, and to enable the spraying apparatus to be kept in good working order. A further object is to provide a ready means for isolating the gas and foul mains from a stand pipe when required. A disc valve, which is pivotally mounted inside the standpipe on the upper end of a rocking arm operated from the outside, and moved into the closed position against a vertical seating, is provided with means whereby it is kept in a vertical position when open, so that there is no tendency to deflect the falling liquor into the retort through the connecting branch. The spray nozzle is arranged to project into the side or top of the standpipe. On the outer end of the spray case is mounted a cock for testing whether liquor is present. In the cock plug is formed a passage which is in line with the axis of the nozzle when the cock is open, and enables a cleaning rod to be inserted. When it is desired to isolate the gas and foul mains from any particular pipe, or to separate one

portion of a pipe or vessel from another, provision is made for the ready insertion or removal of a metal or other disc adapted to be secured by bolts between two flanges on adjacent pipe sections.

Analysis of Coal.—No. 217,828.

ALEXANDER, R., of Greenwich.

No. 26,866; Oct. 26, 1923.

The invention comprises the combination of a crucible adapted to contain a relatively large sample—for example, 1 lb.—of coal, a gas furnace provided with one or more burners for heating the crucible, and a counterbalanced beam for weighing the crucible; the latter being provided with a cover. The apparatus is for the determination of moisture, volatile matter, and ash for practical purposes by untrained assistants.

Gas Burners.—No. 218,022.

CAUDWELL, F., and BELTON, C. M. D., both of Shrewsbury.

No. 9210; April 4, 1923.

The object of this invention is the construction of a burner wherein complete combustion is more efficiently obtained than hitherto. In lieu of the gas passing to the mixing tube through a single opening controlled by a single pointed or needle valve, the gas passes to the mixing tube through a number of openings which can be regulated to control the quantity of gas passing into the bunsen tube. For this purpose a number of grooves are formed on the outer surface of a valve member, the grooves being of a greater cross-sectional area at the outer end of the valve, and diminishing to the inner end of the valve. This valve is slidably mounted in an opening, and when moved fully down entirely cuts off the gas, and when moved in the other direction opens, and variably controls the gas passing through the openings. A number of jets of gas thus enter the mixing chamber, which is of such a size and has air holes of such an area that the required quantity of air is taken up by the gas jets in accordance with the volume of gas passing into the mixing chamber. The air inlet holes in the latter are comparatively large, and allow air to pass into the mixing tube freely and without causing localized currents. In the case of an inverted burner, the mixing tube is connected to a superheater.

Removing Carbon Disulphide.—No. 218,053.

SOUTH METROPOLITAN GAS COMPANY, EVANS, E. V., and STANIER, H. all of London.

No. 11,526; April 28, 1923.

Gases containing hydrogen, such as coal gas, can be purified from carbon disulphide by passing the gas over a metal catalyst, particularly a nickel catalyst, heated to a suitable temperature. The catalyst remains active for a considerable time, but ultimately ceases to be effective on account of the deposition of carbon upon its surface. The deposit of carbon must be removed from time to time by a process of combustion *in situ*. A large proportion of this carbon, in the case of coal gas, is derived from the thermal decomposition of carbon compounds other than carbon disulphide.

According to the present invention, the process is conducted with a nickel catalyst mixed with a suitable proportion (from 10 to 30 p.ct.) of one or more metallic oxides that increase the activity of the metal in promoting the reaction between hydrogen and carbon disulphide, preferably an oxide of thorium, chromium, beryllium, or aluminium. For example, at 400° C. a mixture of nickel and thoria containing about 30 p.ct. of the latter is capable in a given time of freeing from carbon disulphide nearly three times the volume of gas that can be dealt with by the same amount of nickel used alone. It is also possible, by using this more active catalyst, to work at a lower temperature than is practicable in absence of the oxide. A reduction in the working temperature of the order of 50° C. can be effected without diminishing the efficiency of the purification. An advantage of such a reduction in temperature is that decomposition of carbon compounds other than CS_2 is diminished, and consequently there is a smaller deposition of carbon on the catalyst, and the necessity for aeration is less frequent.

As an example, a convenient method of preparing an active nickel-thoria catalyst is given: A quantity of broken pumice is thoroughly washed with hot dilute hydrochloric acid and finally with water, and is dried and impregnated with a solution of 70 p.ct. strength of a mixture of 90 parts by weight of nickel nitrate, $Ni(NO_3)_26H_2O$, and 10 parts by weight of thorium nitrate, $Th(NO_3)_412H_2O$. The pumice is then removed and, after draining away the surplus solution, is dried and heated at a temperature of 450° C. or thereabouts, until there is no further evolution of nitrous fumes. The catalyst is then reduced at about 350° C. in a stream of purified coal gas or other gas rich in hydrogen. A pumice containing 10 to 15 p.ct. of nickel and 2 to 3 p.ct. of thoria is thus obtained.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 23.]

Nos. 16,806 to 17,367.

AKTIEBOLAGET ARCA REGULATORER.—"Regulating devices." No. 16,894.

BOTH, G. J. J.—"Production of gas and/or vapour from hydrocarbons." No. 16,968.

BRITISH ARCA REGULATORS, LTD.—See Aktiebolaget Arca Regulatorer. No. 16,894.

COOKE, A. G.—"Stuffing-boxes for gas-meters, &c." No. 17,036.

FIGG, T.—"Atmospheric gas-burners." No. 17,127.

KÖNIG, G.—"Recording heat value of gas mixtures." No. 16,853.

MADDISON, S.—"Gas taps, &c." No. 17,219.

PHILLIPS, B. C.—See Cooke, A. G. No. 17,036.

REES, S. J.—See Figg, T. No. 17,127.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Companies Amendment (Co-partnership) Bill: Read the third time, passed, and sent to the Commons.

Rotherham Corporation Bill: Reported, with amendments.

Gas Regulation Act.

Last Thursday, on the motion of Lord Muir Mackenzie, the draft Special Orders proposed to be made by the Board of Trade under section 10 of the Act were approved. The applications related to the Emsworth Gas and Coke Company, Ltd., Reading Gas Company, South Bank and Normanby Gaslight and Coke Company, Ltd., and the Watford Gas and Coke Company.

HOUSE OF COMMONS.

The Bedwelty Urban District Council have withdrawn their petition against the Rhymney and Aber Gas Bill.

Pinner Gas Special Order.

A Statement of Objection to the Pinner Special Order has been deposited with the Board of Trade by the London, Midland, and Scottish Railway Company, the Great Western and Great Central Joint Committee, the Metropolitan and Great Central Joint Committee, and the Metropolitan Railway Company. The matter has been referred to the Select Committee appointed to consider the Order.

Gas Regulation Act.

Copies were presented of drafts of Special Orders proposed to be made by the Board of Trade under section 10 of the Act, on the application of the Brighouse Corporation, Chertsey Gas Consumers' Company, Ltd, King's Lynn Gas Company, Middlesbrough Corporation, Oxford Gaslight and Coke Company, Ltd., Sandwich Corporation, Settle Gas Company, Ltd., Sheffield Gas Company, Uttoxeter Gas-Works, Ltd., and the Wirksworth Gas Light and Coke Company, Ltd.

Public Utility Companies (Capital Issues) Act, 1920.

Copies were presented of reports on applications by the Solihull Gas Company and the Wells Gaslight Company to the Board of Trade under the Act.

Manchester Corporation Bill.

This Bill has been considered during the last week by Section A of the Local Legislation Committee of the House of Commons (presided over by Sir Thomas Robinson). It contains only one clause dealing with the gas undertaking of the Corporation (see the "JOURNAL" for May 28, p. 608), and no alteration has been made since the Bill left the House of Lords. It provides for a revision of the area of supply.

Rotherham Corporation Bill.

The Bill of the Rotherham Corporation was before the Unopposed Committee of the House of Lords (presided over by the Lord Chairman, the Earl of Donoughmore) on Tuesday, July 22. There are included in the Bill a few clauses dealing with the gas undertaking (see the "JOURNAL" for June 4, p. 690), and there is one alteration since the Bill left the House of Commons. One clause provides that the power to enter premises and remove pipes, meters, fittings, and apparatus, conferred upon the Corporation by section 22 of the Gas-Works Clauses Act, 1871, shall extend to cases in which any person entering into occupation of premises previously supplied with gas does not require to take a supply from the Corporation or to hire apparatus, &c., belonging to them. When the Bill was in the House of Commons, a sub-clause to impose penalties on persons obstructing the entry of the Corporation for the purpose of removing fittings was asked for, but was struck out of the Bill. This power has been obtained, however, in the House of Lords, and a sub-clause is added, providing that any person having control of the premises which the Corporation are authorized by the Gas-Works Clauses Act of 1871 or this Act to enter, who does not permit such entry, shall be liable to a penalty not exceeding £5, and to a daily penalty not exceeding 40s.

HASTINGS CORPORATION BILL.

Gas Company's Objection to Rated-Aided Electricity Supply.

The Omnibus Bill promoted by the Hastings Corporation contains clauses dealing with the municipal electricity undertaking. The Hastings and St. Leonards Gas Company object to certain of these clauses, the point at issue being that, whereas past deficiencies resulting from the working of the undertaking have been met out of the rates, the present proposals would relieve the Corporation of the necessity for paying back the amounts taken from the rates—in fact, it was contended that it would be illegal to do so. The matter was fought out in the Lords when the Bill was before that House (see "JOURNAL" for April 16, p. 187). The Gas Company's application then failed, and when the Bill reached Section B. of the Local Legislation Committee of the House of Commons, on Tuesday last, the Company again appeared.

The Corporation were represented by Mr. W. J. JEEVES, K.C., and Mr. ROWAND HARKER; and the Gas Company, by Sir HARRY COURTHOPE-MUNROE, K.C.

Mr. HARKER, opening the case for the Corporation, said the Company had a *locus standi* in respect of only two clauses. The first of these provided that all moneys received by the Corporation in respect of the electricity undertaking should be carried to the borough fund, and all payments in respect of the undertaking should be paid

out of that fund. The other clause concerned the reserve fund. It proposed to authorize the Corporation to maintain a reserve fund by setting aside an amount each year up to ½ p.ct. of the aggregate capital expenditure, the total amount of the fund not to exceed 10 p.ct. of the aggregate capital expenditure. The fund was to be applicable to meeting any deficiency on the undertaking, or any extraordinary claim or demand, or for payment of the cost of renewing, improving, or extending any part of the works. This matter had been gone into by the Local Legislation Committee last session in connection with the Torquay Corporation Bill, and the clause providing for the payment of money into the borough fund and taking money out of that fund to meet expenses was word for word the same as in the Torquay Act. The clause relating to the reserve fund, however, differed from the clause in the Torquay Act. In that case the Committee had approved of the principle that a reserve fund could be built up, if the local authority thought it necessary, out of rates; but the clause in the present Bill had been amended to provide that the Hastings Corporation could only build up the reserve fund out of the profits of the undertaking. He mentioned this particularly, because one of the grievances which the Company thought they had in the other House was that the Corporation might, by levying a rate in aid of the electricity undertaking, build up a reserve fund at the expense of the Company, as ratepayers, and also as competitors. The real point, he gathered, was whether the Corporation were to be entitled to retain the power they had had since 1898 to charge any deficiency which might arise, owing to unforeseen circumstances, in connection with the electricity undertaking, upon the rates. He admitted that there had been deficiencies on the undertaking, which had had to be charged on the rates; but Hastings was not alone in this. At present, however, they were making a profit. He did not know if the Company would say that profits should not be allocated to rates; perhaps they were in a more quixotic mood than when they were in the other House. The Corporation were not seeking any real alteration in their existing powers. As to deficiencies, they merely asked that they should have the right to charge deficiencies to the borough fund, instead of to the general district fund, and that was purely a matter of machinery. If there were any surplus, it would remain in the borough fund, and there was no substantial difference between that provision and the provisions of the Electric Lighting (Clauses) Act, 1899, and subsequent Amending Acts. The present Bill provided that the undertaking should be subject to the general law, and that so much of their Provisional Order of 1898 (under which they were now working) as was inconsistent with the general law should be repealed. The Corporation were in a better position than when before the House of Lords, in that they had the complete accounts for the year to March 31, 1924, which showed a net profit on the undertaking of over £12,000.

Sir HARRY COURTHOPE-MUNROE offered his congratulations, but said his concern was that the money was not spirited away.

Mr. HARKER handed in a table dealing with the working results of the electricity undertaking since it was taken over by the Corporation in 1898, the deficiency raised by rate, and the transfer in aid of rates. From this it was seen that from 1898 to 1911 there were net profits in four years, and net deficiencies in each of the remaining nine years, and in six of those years deficiencies had been met by the rates. In 1912, however, a profit had been made, and this state of affairs was continued until 1916, when war conditions resulted in a further period of loss; the total loss during the period 1916-19 amounting to more than £20,000. In 1920 there was a profit, in 1921 a small loss, and since then there had been substantial profits, which amounted, on March 31, 1924, to £12,045. The table showed a profit during the whole period of £35,313, against a loss of £39,831, the total deficiency to March, 1924, therefore, being £4518. The deficiency raised by rate was £35,232, of which, during the last three years, £4140 had been repaid, leaving the net amount raised by rate at £31,092. The reserve fund was £20,000, and the balance of unappropriated profit £6663, making the total reserve at March, 1924, £26,663. The position, said Counsel, was that the reserve fund, as it existed to-day, was substantially money which had been taken from the rates. This situation, which was objected to as being bad finance, could not occur again in the future, because they could not make any contribution to the reserve fund, if the present Bill were passed, unless a profit were made.

Questions were raised by members of the Committee as to the balance of unappropriated profit. It was pointed out that, under existing provisions, profits must go to reserve or to relief of the rates, and that it was a little irregular that profits in respect of the last two financial years had not yet been appropriated. Counsel, however, replied that the amount was substantially in respect of the year 1923-24, and steps were being taken to deal with it as set out by the Statutes.

Mr. HARKER, dealing with the petition, pointed to a submission by the Company that the result of the working of the electricity undertaking was not such as to warrant any further powers being conferred upon the Corporation, unless proper provisions for the protection of ratepayers who were not consumers of electricity were inserted in the Bill. He believed the contribution of the Gas Company towards the amount levied in respect of the electricity undertaking was not more than £26 in any year. The real point was that the Company wished to keep up the price of electricity.

The petition also pointed out that the Company were in a different position from that of other ratepayers, inasmuch as they were not entitled to vote at meetings of ratepayers held in pursuance of the Borough Funds Act to approve the promotion of the Bill. Further, it was contended that a municipal public utility enterprise should be self-contained and self-supporting, and that the merging of receipts and expenditure in the borough fund removed the stimulus for making such an enterprise self-supporting. The present deficiency was mainly due to the fact that the charges made to consumers were not sufficient to meet manufacturing costs and the interest and sinking fund charges, and, having regard to the fact that a new electrical station was being erected, which would involve a further large capital expenditure, and further heavy annual interest and sinking fund charges, the Company viewed with alarm the proposal to make good deficiencies out of rates. They had no opportunity of making effective representations to the Electricity Commissioners on any application made by the Corporation for powers to borrow further money. The Commissioners were not concerned with the ratepayers' interests. As to the power sought to apply the reserve fund to renewing, improving, or extending the works, it was pointed out that the Corporation had materially extended their works to a capacity far in excess of the requirements of the borough, and it was believed for the purpose, *inter alia*, of supplying in bulk to Bexhill. Strong protest was made against diversion of moneys which, it was directed, should be employed for the benefit of ratepayers within the borough, for the benefit of consumers of electricity outside the borough. The clause referring to the reserve fund was regarded as unnecessary, inasmuch as it was already provided for by the Electric Lighting (Clauses) Act, and the petitioners asked for the insertion of a clause to limit the resort which might be made to the rates, as well as the amendment of the clauses to which objection was taken, to make them consistent with the General Act.

Mr. HARKER, dealing with the extension of the electricity works, said that a further deficiency had been budgeted for next year in respect of the undertaking. The generating station was being reconstructed, and up-to-date plant was being installed to replace the existing plant, which was more or less obsolete. There was bound to be a transition period while changing over from the old to the new plant, and before the full load could be placed on the new station, and a loss was budgeted for during that period. He would undertake, however, as he had done in the other House, that this loss would not be charged to the rates. It would be only temporary. The petitioners were safeguarded against contributing to the rates for the purpose of enabling the Corporation to supply in bulk. As to the suggestion by the Company that there should be inserted in the Bill the well-known Winchester Clause, which, in effect, limited the resort which might be had to the rates, Counsel said that since 1914 the Board of Trade, and later the Electricity Commissioners, had consistently refused to insert it in Provisional or Special Orders made under the Electric Lighting Acts. The last attempt made to insert the clause was in the case of the Worthing Corporation Act of 1922, where the Worthing Gas Company had asked for it, but Parliament had refused to insert it.

Mr. *Arthur Collins* said the capital expenditure outstanding on March 31, 1924, was £170,000, and the expenditure on capital account was approximately £360,000, so that a considerable amount had been wiped off. He expressed the view that, had there been no war, the undertaking would since 1912 have been a constant and substantial source of profit to the Corporation. In the last two years it was in an uncommonly good position.

In cross-examination, Sir HARRY COURTHOPE-MUNROE made the point that when the clauses objected to in this case were inserted in the Torquay Bill there was no objection by anybody. Dealing with the insertion of the Winchester Clause, previously termed the Bermondsey and the Northumberland Clause, this, in one form or another, said Sir Harry, had been inserted in 42 cases between 1902 and 1914. Since the war the only case fought had been that of the Worthing Corporation.

Re-examined, witness said that in the Torquay case the Committee had considered very closely the clauses now objected to, because they were questioned by Ministerial Departments, and particular attention was paid to the supply of gas in Torquay, where a Company operated in the greater part of the borough. Of the £31,000 which had been taken from the rates in Hastings, the Gas Company had borne an average of about £6 per annum.

Mr. *G. R. Butterworth* (Borough Treasurer, Hastings) handed in a table showing the charges made for electricity by the Corporation from 1914 to the present time. Taking general lighting as an example, he said the charges were raised in 1916, 1917, and 1920, and were reduced in October, 1922. The present charges for general lighting were 6d. per unit up to the first 4000 units, as against 6½d. pre-war. The price for units consumed over 4000 was 5½d. It was the policy to make the undertaking self-supporting. As to the period during which losses were incurred, he said the deficiencies between 1900 and 1903 were due to the introduction of the metal filament lamp. The next period of loss was between 1908 and 1911, due to an exceptional period of depression in Hastings; and the third period of loss, from 1916 to 1919, was owing to the war. Therefore, they were all exceptional periods, and were met as speedily as possible by the Corporation. As to the deficiency anticipated during the transition from one generating station to another, this had been estimated previously at £7000, but he was now satisfied that it would be only £3000. This was the reason why the unappropriated profits had not been disbursed. If they transferred the whole of the profits of 1923 and 1924 to relief of the rates, it would cause a great disturbance in the rates, and there would be no justification for such a course financially. The Corporation were at present relieving rates at about £2000 per annum, with a view to paying back the whole amount taken from the rates in the past.

Cross-examining, Sir HARRY COURTHOPE-MUNROE made the point that the Corporation sought to establish a different form of reserve fund from that which they were at present authorized to build up, and said that the reserve fund it was proposed to establish could be applied to the extension of works.

Witness remarked that this was a matter of degree, as the reserve fund was limited to £35,000.

Mr. HARKER interpolated that the Corporation were not allowed to extend works without authority from the Electricity Commissioners, and it had been held recently in the High Court that the placing of a new generating set into an existing building was an extension of the generating station, which could only be done by the consent of the Commissioners.

Asked by a member of the Committee if electricity for street lighting, which had been supplied at 2·38d. per unit since 1914, gave the Corporation a profit, witness said it did not involve loss. They were supplying under a contract terminable at any time, and were supplying for street lighting as cheaply as, if not cheaper than, the Gas Company could furnish gas. Part of the lighting was done by electricity, and part by gas. The price of gas was still considerably above the pre-war price, whereas, for general lighting, electricity was cheaper than before the war.

Sir HARRY COURTHOPE-MUNROE then addressed the Committee on behalf of the Company. Regarding the reserve fund, it appeared to

him that one clause in the Bill purported to bring into operation the provisions of the Electric Lighting Clauses Act, 1899, and the other clause apparently proposed to wipe it out again. He foresaw great difficulty in deciding which clause was operative. Under the General Act, the reserve fund must be raised ex-profits, and those profits would ultimately find their way back in aid of the rates. But the effect of the clause asked for in the present Bill, which might have been put into the Torquay Bill last year, when there was no opposition *ad hoc*, was to alter the general legislation of the land. The present proposal was an insidious attempt to get rid of the effect of the scheme laid down by Parliament in 1899, when they allowed a certain class of competition by municipalities with other traders, on a distinct understanding. The Corporation had had £31,000 from the rates; but in the last year or two they had turned the corner, and were now making substantial profits. Under the general law this should go to the reserve fund, and the consequence was that the surplus would eventually be applied to relief of the rates. But the Corporation did not propose to put the surplus of the last year or two to the reserve fund so that the ratepayers should receive some of their money back. They were going to create a brand new reserve fund, and, had he not come on the scene on behalf of the Company, they would have built up a reserve fund *ex* rates, and not *ex* profits, and would have made provision to prevent any portion of it going back in aid of the rates. His first objection, that the fund would be raised *ex* rates, had been conceded; but the second point was still in the air, and he wanted the money available to be paid back to those who had provided it in the past. They could spend the whole of the reserve on extensions, without paying back one penny of the £31,000 taken from the rates. The General Act of 1899 provided for the allocation of the moneys received in respect of the undertaking. After paying expenses, and interest and sinking fund charges, the remainder was to be applied to a reserve fund, and the net annual surplus was to go to the credit of the local rates, or to the improvement of the district, or the reduction of the price of electricity. It was wrong to re-cast the Act of 1899 in respect of only one undertaking, and to pass the present proposals would mean altering absolutely the terms on which the competition of municipal authorities with trading companies was allowed by Parliament. Actually, under the present proposals, it would be illegal to pay back to the ratepayers any part of their profits on the undertaking. He had no objection to the proposal to place the Corporation under the provisions of the Act of 1899, instead of under their original Order of 1898, but he objected to amending the General Act bit by bit. If this were done, the same thing would be asked for in future Bills, and gradually the general law would be eaten away. As to paying moneys into the borough fund, and taking moneys out of that fund to meet the expenses of the undertaking, he objected to throwing all the money into a hat and pooling it. It was dead against the law as it stood at present. If the Committee still saw grounds for inserting the new-fangled clause dealing with the reserve fund, he would be content if a clause were also inserted providing that, if the charges for electricity were not sufficient in any year to pay the cost of working, then they should be increased.

Sir CHARLES WILSON (a member of the Committee), dealing with Sir Harry's argument that none of the money borrowed from the rates could be paid back if the proposals in the Bill were approved, pointed out that the limit of the reserve fund was £35,000, and that after that limit had been reached the whole of the remaining profits would go to relief of the rates.

Sir HARRY COURTHOPE-MUNROE said his point was that, the moment there was likely to be an overflow, the Corporation could spend the money on extending the works, under the ample powers they were seeking.

Asked by Sir Joseph Nall if he objected to the Corporation extending the undertaking out of profits, Sir Harry said that, until they paid their debts, he did.

Sir JOSEPH NALL inquired how Sir Harry would reconcile his point of view with the principle adhered to by the Local Legislation Committee in connection with public utility undertakings in the last year or two—namely, that neither profit nor loss should go to or from the rates.

Sir HARRY COURTHOPE-MUNROE entirely agreed with this policy, when they were making a fresh start; but here there was £31,000 outstanding.

Mr. HARKER briefly replied on the points of law raised by Sir Harry, who, he said, had misconceived the effect of the clause providing for the payment of revenue into the borough fund and the charging of expenses to that fund. If there were profits, they went into the borough fund, and were there for the benefit of the ratepayers. Then the Corporation had to deal with it as a matter of accounting. It seemed to have escaped entirely the observation of the Company that the creation of a reserve fund by the Corporation was entirely a matter of discretion. They were entitled, before putting one penny to the reserve fund, under the General Act, to do the very things which the Company complained of. If no reserve fund were built up, there would be a net surplus, which would go to the credit of the local rates, or be used for the general improvement of the district. The Bill did not alter this situation one iota; the borough fund was merely substituted for the general district fund. Assuming the Corporation did place a certain sum to reserve, they could, if they thought fit, treat the balance as a net surplus, which they could pay to the rates or use for the improvement of the district. This was his answer to the suggestion that the Corporation could not legally pay back to the ratepayers the money which the ratepayers had already contributed.

After deliberating in private, the Committee decided that the clauses should stand, with the amendment already indicated in the clause dealing with the reserve fund—viz., that it can only be built up out of profits, and not by calling on the rates.

Cardenden Gas Company.—The accounts for the year ended May 31 show a profit (together with the balance carried forward) of £2643. A dividend at the rate of 7½ p.ct., free of income-tax, was paid, and £1000 placed to the reserve fund.

MISCELLANEOUS NEWS.

L.C.C. AND THE SALE OF COKE.

The Question of Moisture.

The Public Control Committee of the London County Council, who have had under consideration from time to time cases in which the existence of serious short weight in deliveries of coke has been established, but in which they have been advised that no effective legal action was possible under the existing law, some time back submitted a report in which they recommended that: "In view of the unsatisfactory conditions prevailing in connection with the sale of coke in London, the Council are of opinion that legislation should forthwith be initiated by H.M. Government to provide that all coke should be sold by weight."

When the report came before the Council last May, Mr. Johnson suggested the addition to the recommendation of the words "and that a standard of dryness be prescribed," and Mr. Jacobs (the Chairman of the Committee) agreed to let the whole report stand over pending consideration by the Committee of Mr. Johnson's suggestion. At last week's meeting of the Council, the Committee again presented their report [see "JOURNAL" or May 21, p. 544], with additions on the subject of moisture.

They say that in connection with their consideration of the matter, a deputation from the Society of Coal Merchants attended before them on June 27. The deputation stated that they welcomed a proposal to regulate the sale of coke by weight, but were of opinion that in certain circumstances difficulties might be experienced by merchants. Coal merchants purchase coke from two sources—London gas-works and sources beyond London. Coke coming into London from the provinces is delivered into coal depots at railway sidings and weighed by the coal merchants' own servants for delivery to customers. Coke purchased from London gas companies is in the main weighed for delivery to customers at the gas-works by servants of the gas companies, and the servants of the coal merchants do not interfere in such weighing. The deputation felt that coal merchants should be safeguarded against risk of deficiency in weighings by gas companies' servants. Due regard, say the Committee, will, of course, be paid to this representation, but they have no doubt that it will be an easy matter for the merchants and gas companies to come to a satisfactory working arrangement whereby the former will be satisfied that these weighings will be as reliable as those carried out at coal merchants' depots. It frequently happens in the coal trade that one merchant delivers to an order obtained by another merchant.

It has been suggested that, if coke is sold by weight, it is likely to be watered, with a view fraudulently to increase its weight. The Committee accordingly discussed this question with the deputation. They point out that, as coke is drawn from the retorts, it is immersed in water to cool it and stop combustion. Evaporation of the water takes place freely, and as a rule only cooled coke is sold at the gas-works. Occasionally, when there is a great demand, coke is sold while still warm, and water is copiously poured over the containing sacks to prevent them from igniting. In these cases some allowance is made for this watering of the coke as it is being weighed up. The deputation informed them that coke immersed in water has been found to absorb up to 15 p.ct. of its weight, but some of the water rapidly drains away, while most of the remainder gradually evaporates. It is, the Committee go on to say, obvious that large quantities of coke in the mass cannot easily be immersed in water, so that a fraudulent watering of coke must be done by some less drastic means, and, to be effective, it must be done immediately before the weighing, and be followed by early delivery. The deputation stated that, even if a certain class of small trader were disposed to act fraudulently by watering coke, experiments have shown that the increase in weight of one pailful (7 lbs.) would only be ½ lb., even assuming that the sale took place within twenty minutes of watering.

The Committee are of opinion that the risk of such fraudulent practices has probably been exaggerated, and that, in any case, the disadvantages of not selling by weight are far greater. In order, however, to guard against the possibility of unscrupulous traders seeking to exploit the poor, they suggest that it should be made an offence to water coke with a view fraudulently to increasing its weight. They are advised that it would be possible to ascertain whether or not this has been done by examining the containing sack. With regard to the effect of rain upon coke, experiment shows that to add 1 lb. to the weight of a sack containing 1 cwt. of coke conveyed on a van would require about 1½ hours of ordinary steady rain. The Medical Officer of Health arranged for the Chemist to make a series of experiments to test the amount of moisture in coke, its capacity to absorb moisture, and the extent to which in dry atmosphere moisture can be evaporated. His conclusions are not inconsistent with the statements made by the deputation and set out above.

The report concludes with a repetition of the previous recommendation, quoted in the opening paragraph of this article, with the addition of the following words—"and that it should be made an offence to water coke with a view fraudulently to increasing its weight."

When the Council met on Tuesday of last week, under the Chairmanship of Mr. J. Herbert Hunter, the report was received and adopted without discussion.

Public Lighting in the City of London.—At the last meeting of the Court of Common Council of the Corporation of the City of London, the Streets Committee reported relative to the allowance made to the City of London Electric Lighting Company on the pre-war public lighting contracts. They recommended that this Company be given the same proportionate allowance as the Gas Light and Coke Company, whose percentage increase over the pre-war rates is reduced by 10 points for every penny reduction in the price of gas per therm. The recommendation was carried.

GAS LIGHT AND COKE COMPANY.

Annual Lunch and Flower Show.

The happy relations existing between the Gas Light and Coke Company and their employees was once again marked by the annual luncheon given by the Board of Directors on Saturday, the 19th inst. The guests, who numbered some 550, included members of the Co-Partnership Committee, of the Works Committees at the various stations, and the various Committees of the Sports Association. Last, but not least, came the workmen of the Company recently pensioned, and seven workmen who were to receive awards for long service. The luncheon took place at the Company's Sports Ground at East Ham, and was enlivened by the Band of the 12th Battalion of the London Regiment (the Rangers), of which the Governor is Honorary Colonel, conducted by Alex. E. Benson Ansley. The Governor received the guests, and an excellent luncheon was served by the Company's Catering Department.

After honouring the usual Loyal Toasts, the Governor presented the seven workmen whose service with the Company varied from 47 to 50 years with clocks or watches and a sum of money. In one case the grandfather, father, brother, and two sons of the recipient had been, or were still, in the Company's service, the total number of years' service among the six being 230 years.

The Governor expressed the gratification of the Board of Directors at this annual opportunity of meeting the representatives of the Company's vast body of employees, and expressed his conviction that the happiness of the workman was one of the most important factors in making him efficient.

Three co-partners and a representative of the men recently pensioned replied, and conveyed the thanks of those present to the Governor and Board of Directors for maintaining this annual gathering, which was doing so much to cement the existing good relations between the Company and their employees.

After lunch, the ground was thrown open to employees of the Company and their wives and families, and a varied entertainment in the way of cricket, tennis, golf, and bowls—not forgetting the annual flower show—was provided for the guests.

Upwards of 12,000 responded to the Directors' invitation for the afternoon, and were entertained at tea.

THE PRODUCTION OF AMMONIUM SULPHATE IN 1923.

The recovery of ammonia from bituminous coal treated in coke or gas plants continues to be the major source of the world's sulphate of ammonia supply. Recently there has been a distinct swing towards a better quality of sulphate. This was originally started in Germany before the war, when they marketed a dried and screened product which received a creditable reception in export markets. Since the war, England has put out dry neutral sulphate. Over 70 p ct. of the English production is now neutral, and it is expected that in the next year or so the total production will be of this quality.

Production of the United Kingdom.—The amount of sulphate manufactured in 1922 was 351,142 gross tons. Estimates for 1923 place the production at 400,000 to 425,000 gross tons, which is the highest figure since 1918. Exports amounted to 253,287 tons, as compared with 144,317 tons for 1922; the heaviest increases being in Spain and Japan. The home consumption was about 140,000 tons.

Production in the United States.—The recovery of coke-oven ammonia for 1923 easily surpasses all previous figures, amounting to 619,000 tons. It is accounted for by the average operation of the coke plants at something over 85 p.ct. of their total maximum capacity. The exports of sulphate have shown a slight increase; being 150,544 tons, against 147,331 tons in 1922. The major part went to the Orient.

Production in Germany.—Germany has a net exportation of 118,880 metric tons. Home consumption is estimated at 1,000,000 tons of sulphate.

Production in France.—The manufacture of sulphate in France reached its highest point in 1923—viz., 88,500 metric tons. There was a moderate increase in the amount recovered at gas-works.

PRICES OF MANTLES FROM ABROAD.

The Government are proposing to remove the duty from imported gas mantles in August, and so make a present to be shared between the German manufacturer and the British importer. Recent returns of mantle imports show:

From Germany	1285 gross for	£609, or	1d. each.
,, Poland	1304 ,,	,, £1077 ,,	1¼d. ,,
,, Austria	1060 ,,	,, £1074 ,,	1¼d. ,,

Similar foreign mantles were bought a few days ago by an investigator, who paid:

In Shoreditch	6d.
,, Fleet Street	7d.
,, Brompton Road	7½d.

Who gets the difference? The retailer buys at: 48s. to 60s. a gross, or 4d. to 5d. each. So the importer and middleman each get from 150 to 200 p.ct. profit!

Teignmouth Gas Report.—In his annual report for the year ended March 31, Mr. H. Higham, the Engineer and Manager, states that there was an increase of 7,129,100 c.ft., or 12½ p.ct., in the amount of gas sold. The expenditure on the Department, omitting capital charges, was £18,209, while the total income was £20,124, leaving a balance of £1914 to meet the capital charges, which amounted to £1888. No capital expenditure was incurred during the year. The consumers now number 2016, compared with 1909 last year. The coal carbonized was 3712 tons, and the residuals produced were: Coke 1413 tons, tar 36,029 gallons, and sulphate of ammonia 14 tons.

SOUTH METROPOLITAN CO-PARTNERSHIP FESTIVAL.

A Big Gathering at the Crystal Palace.

A day of varied and enjoyable entertainment marked the Co-Partnership Festival of the South Metropolitan Gas Company, which was held on Saturday last at the Crystal Palace. It was a big muster, for no less than 8300 tickets were issued to co-partners and their wives, and children who took part in the sports.

The programme opened early in the afternoon with swimming races in the boating lake, and thereafter a crowded card of "events" was gone through on the sports ground. The various items provided ample scope for a display of the large measure of athletic talent which is possessed by the Company's employees; and with regard to the arrangements generally, it is only necessary to say that the Organizing Secretary was Mr. A. Coleman, than whom no one better qualified to have charge of affairs could be found. One is inclined to wonder how many of the well set-up members of both sexes who took part in last Saturday's proceedings owe their "fitness" to the untiring efforts of Mr. Coleman. For the Swimming Races Mr. J. H. Kimber was Referee and Starter; Mr. J. W. Morfill, Check Starter; Messrs. A. Mathers, C. Goldsmith, and J. Nolan, Judges; and Mr. H. Putt, Timekeeper; Mr. J. W. Dawson, Boat Steward; and Mr. J. W. Morfill, Swimming Hon. Secretary. Among the officials for the Sports Meeting were: Mr. F. Day, Referee; Messrs. W. Beard, H. Fox, T. W. Collins, J. A. White, W. Jones, J. W. Simpson, H. Manley, C. Belben, Judges; Mr. W. Grant, Starter; Messrs. R. C. Macdonald, H. Putt, and H. Wright, Timekeepers; Mr. F. Andrews, Clerk of the Course; Messrs. J. A. White, A. E. Bickerton, W. Grant, F. Andrews, and R. Murphy, Handicap Committee; and Mr. A. E. Bickerton, Hon. Sports Secretary.

Unfortunately, during the afternoon rain fell heavily; and though, as Dr. Charles Carpenter (President of the Company) subsequently remarked, the competitors probably did not mind very much whether they were running, &c., in fair weather or foul, the part of the onlooker was attended by inconvenience. However, in this respect as in others, good organization showed itself. Mindful, perhaps, of weather uncertainties, those responsible had "hedged" by arranging a "fifty-fifty" programme—that is to say, one-half in the grounds and the other half under cover—and after tea everybody proceeded to the centre transept for the Co-Partnership Meeting.

Here they witnessed an admirable display, by both sexes, of Swedish drill and dancing, accompanied by the South Metropolitan Gas Company's Military Band (Mr. Sydney Herbert, Conductor). This, again, was under Mr. Coleman, who, as the President pointed out, "is responsible for the physical training which forms part of the principle on which the Company's work is conducted." As bearing upon this remark, the following may be quoted from the programme: "Every exercise performed in physical training is one of co-ordination, bringing mind, nerve, and muscle in direct sympathy with each other. It is the constant performance of these exercises which develops quickness in action and presence of mind." Then followed the distribution of the handsome prizes, and a full day was brought to a close by dancing to the music of the South Metropolitan Gas Company's Co-Partnership Orchestra, under Mr. Sydney Herbert. Before handing the prizes over to the winners, a short address was given by the President—who was supported on the platform by Mr. Frank H. Jones (Vice-President), Mr. Frank Bush, Mr. Honoratus Lloyd, K.C., Mr. T. Manley (Directors), Mr. Frederick M'Leod (General Manager), and other chief officers.

The Three Partners.

The President (who on rising was greeted with applause) said he did not propose to detain them long, because there was so much of interest to engage their attention; but he would regret the loss of an opportunity such as this to extend to them a very hearty welcome on behalf of the Board of the Company, and to say how very much the Directors rejoiced that so many of the co-partners had been able to accept the invitation to be present at this Co-Partnership Festival. He sometimes wondered whether it was fully realized what this word "co-partnership" stood for, and for how long it had been a guiding post to so much of the work which the Company had undertaken. This year was the centenary of what might be termed the parent Company from which the present one was formed. One had only to reflect on what the state of things was a hundred years ago, to realize the important part played by co-partnership in the history of the Company. For one-third of that century the co-partnership principle had been in operation in the Company, and it could not therefore have failed to contribute very largely to the success which had been achieved in this period. The three partners in the co-partnership were, as all of them were aware, the consumers, the shareholders, and the employees. They might ask themselves what was the view that each of these three partners of co-partnership had of its operation. He wondered whether the consumer would have any broader idea, if he were asked, than that its effect had been to provide him with a supply of cheap gas, and that the employees were always courteous and efficient when they waited upon him. Many of the shareholders, no doubt, would remark: "Well, I believe it is a prosperous undertaking, and we always get our dividends regularly, now that the war trouble has ceased." The bulk of the employees would probably say: "We are working under pleasant conditions." Well, this would be a much too limited view to take of the co-partnership, which provided one of the necessities of life to South London—a necessity that was not less important to-day than it had been in the past. If the ideal was to be realized, it was important that all three partners of the co-partnership should regard its operation with a much greater breadth of view. In the case of the employees, for instance, if they were permeated with the true spirit of co partnership, their pleasure in the morning would be that they were leaving home to work in their own works, in their own shops, or in their own district—not in "a" works, in "a" shop, or in "a" district, but in something in which they had a very definite and absolute interest, with which they had a very close concern, and with regard to which they were partners in the truest sense of the word. Co-partnership, like any other partnership, had its

obligations and its duties, and any less ideal than he had indicated in the perception of these obligations and these duties on the part of the employees would, he felt sure, result in something less being achieved than that which the Directors set out to reach when they promoted four years ago an Act of Parliament giving statutory effect to the conditions with which most of the co-partners were so familiar. The obtaining in 1920 of this statutory authority was, he thought, one of the greatest steps that had been made for some years past in the progress of the co-partnership.

The Directors hoped that in the future, as in the past, the employees would justify that confidence which had been placed in them by the consumers, whose representatives had agreed to the conditions under which they were working to-day, and by the shareholders, who had provided the necessary funds to enable this large undertaking to be carried on. While the co-partners were large holders of the capital of the Company, there was still considerable room for an increase in this respect. It was to the advantage of themselves and the other shareholders, and no less to the consumers, that the holding of the employees should increase year by year. In that way they would be achieving an increase in the prosperity of a business which was already so largely their own.

CENTENARY OF THE BRITISH GAS LIGHT COMPANY.

Employees and Relatives at Wembley.

In celebration of their Centenary, the British Gas Light Company, Ltd., entertained the whole of the employees of their several stations, together with their wives or other relatives, at the British Empire Exhibition at Wembley. In order that every employee should have the opportunity of taking part in the celebration, three excursions were arranged, the Company providing return railway fares, free admission to the Exhibition, and two good meals. Each employee was also given a money present.

The first excursion took place on July 10, the party consisting of employees and their relatives to the number of 783—namely, from Norwich 734, Trowbridge 37, and Holywell 12. The Norwich party journeyed up by special train, breakfasted at Liverpool Street Station, and afterwards proceeded by motor coaches to Wembley. Here they were joined by the Trowbridge and Holywell parties, and all dined together in the Stadium Hall. Mr. Henry Woodall, M.Inst.C.E. (Chairman of the Company), presided, and was supported by Mr. Harold G. Palmer (Deputy Chairman), Mr. A. W. Brookes (Secretary), and Mr. Thomas Glover, C.B.E., M.Inst.C.E., Mr. E. A. Sainsbury, and Mr. A. T. Howard (the Engineers of the three stations represented). After dinner, the Chairman spoke of the pleasure it gave him to welcome on behalf of the Company the employees from Norwich, Trowbridge, and Holywell, and announced that, in further celebration of the Centenary, the Board intended next year to inaugurate a definite pension scheme, which would take the place of the existing scheme, under which employees who had served the Company for a number of years were granted allowances during the pleasure of the Court of Directors. The announcement was received with great applause.

Mr. Glover, speaking on behalf of all the employees present, thanked the Board for their kindness, and asked the Chairman to accept from them, as a memento of the occasion, a set of silver salvers. A gold cigarette case was presented to Mr. H. G. Palmer, and a case of pipes to Mr. A. W. Brookes. All the recipients expressed their appreciation of the gifts.

On July 15 a second party of over 700 persons—namely, 668 from Hull, 26 from Trowbridge, and 12 from Holywell—were entertained. Dinner, as before, was served in the Stadium Hall, under the chairmanship of Mr. Henry Woodall, who was supported by Mr. A. W. Brookes (Secretary), Mr. H. E. Copp (Engineer of the Hull Station), Mr. John Young (a former Engineer of the station), and others. At the conclusion of the dinner, Mr. Woodall expressed his pleasure at the opportunity of entertaining the staff, and again referred to the Board's intention to introduce a pension scheme, the announcement being warmly received.

Mr. Copp then tendered to the Chairman and Directors the cordial thanks of all present for their great kindness in entertaining the employees and their relatives, and, on their behalf, presented the Chairman with a silver cup and a set of four coasters, as a token of their respect and a memento of the happy occasion. A set of silver-backed hair brushes was presented to Mr. A. W. Brookes. The Chairman and Secretary both expressed their thanks.

The remainder of the employees at Hull and Norwich, with their relatives, made up a third party of 429 on July 17—320 from Hull, and 109 from Norwich. Dinner was again served in the Stadium Hall, but, on this occasion, the chair was taken by Mr. Harold G. Palmer, in the unavoidable absence of the Chairman. He was supported by Mr. A. W. Brookes, Mr. H. E. Copp, and other officials. In his remarks, Mr. Palmer referred to the decision of the Directors to inaugurate a pension scheme, the announcement being very cordially received by those present.

On behalf of the officials and employees, Mr. Copp presented to Mr. Palmer a silver card dish, and, in doing so, said that all were proud to serve a Company which had behind it the distinguished traditions of good and faithful service to the public during a century. Mr. Palmer suitably acknowledged the gift, and Mr. Brookes expressed the thanks of all present for the Company's hospitality, and for the opportunity which had been afforded them of visiting the Exhibition.

The second and third parties were further entertained at tea in th Stadium Hall.

The greatest satisfaction was expressed by representatives of all departments of the Company's several stations at the kindness extended to them and the arrangements which had been made for their comfort and enjoyment.

GAS REGULATION ACT APPLICATIONS.

There has appeared in the "London Gazette" the following further notice regarding application to the Board of Trade under the Gas Regulation Act.

SPECIAL ORDER.

Barry Urban District Council.

The Council are applying to the Board of Trade for an Order under section 10 of the Act to authorize them to use scheduled land for gas purposes, to enable them to purchase additional lands, and to confer upon them further borrowing powers, &c.

STOKE-ON-TRENT GAS DEPARTMENT.

In his report of the year's working of the Stoke-on-Trent Gas Department, presented to the Town Council last week, Mr. A. Mackay, Chief Engineer and General Manager, states that the financial results may be considered satisfactory; the total expenditure being £242,538, and the total income £312,601, which results in a gross profit on revenue account of £70,062. The year ended March 31 completes the first year of the unification of finance and the selling price of gas for the Department, with the result that all financial statements for the five works are combined in the balance-sheet. The outstanding feature of the revenue account is that receipts from residuals, amounting to £91,953, are satisfactory, and represent 1s. 6d. per 1000 c.ft. of gas sold. The number of consumers has increased from 49,618 to 49,996, and 39,565,900 c.ft. more gas has been sold—an increase of 3·4 p.ct. At Longton the sale of gas has created a record for that area, showing an increase of 3,387,000 over the highest figure. The make of gas per ton of coal carbonized for the five works was 63·14 therms, and the gas sold 59·11 therms.

At the beginning of the year a fixed price of 3s. 8d. per 1000 c.ft., or 9·37d. per therm, was made, and further concessions were given for industrial purposes, ranging to a minimum of 2s. 8d. per 1000 c.ft., or 6·81d. per therm. The following table gives the general results for the year.

General Results.

—	1923-24.	
	C.Ft.	Therms.
Coal gas made	1,212,050,000	5,917,627·60
Water gas made	133,188,000	404,891·00
	1,345,238,000	6,322,618·60
Gas sold—ordinary meters	595,510,700	2,798,900·25
Do. automatic meters	542,942,700	2,551,830·58
Do. public lighting	63,647,100	299,141·46
Gas used on works, &c.	12,945,600	60,844·35
Gas unaccounted for	130,191,900	611,901·96
	1,345,238,000	6,322,618·60
Increase of gas sold over previous year	39,565,900	185,959·73
Increase of gas sold, p.ct.	3·40	
Coal carbonized (tons)	90,210	
Gas made per ton	13,435 c.ft.	63·14 therms
Gas sold per ton	12,095 c.ft.	59·11 therms
Gas unaccounted for, p.ct. on make	9·68	
Coke for water gas manufacture (tons)	2,003	
Coke saleable (tons)	47,664	
Coke saleable per ton of coal carbonized (cwt.)	11·01	
Tar made (gallons)	1,007,959	
Tar made in gallons per ton of coal carbonized	11·17	
Sulphate made (tons)	775·76	
Do per ton of coal, in lbs.	26·08	
Liquor made (gallons)	725,369	
Do. per ton of coal, in gallons.	30·76	
Number of public lamps	4,162	
Number of meters in use—ordinary	12,471	
automatic	37,525	
Number of stoves on hire	18,372	

Mr. Bowers (the Chairman of the Gas Committee), in presenting the report, said that the year's working had resulted in a net profit of £20,125. The work in connection with the first part of the centralization of gas manufacture had been put in hand last November, and the progress made was excellent. The undertaking had been well and soundly managed by Mr. Mackay, and served by a capable and reliable staff.

New Gas Plant for Edinburgh.—The Edinburgh Town Council, at a recent meeting, accepted the tender of the Woodall-Duckham Company, London, for the installation of new carbonizing plant. There is at the works a suitable area available for the new installation without interfering with the present carbonizing arrangements, and it has been decided to put in two parallel lines of benches containing 88 retorts in all. These retorts are each guaranteed to carbonize over 8 tons of coal per 24 hours. The daily output will be approximately 11 million c.ft. of gas, and between 700 and 750 tons of coal will be utilized per day in the process. It is anticipated that half the plant will be in operation within twelve months, and the remainder three months later; and until this is completed the present retorts will be kept in use.

MIDDLESBROUGH CORPORATION GAS ORDER.

The draft of a Special Order which the Board of Trade propose to make, under section 10 of the Gas Regulation Act, in respect of the gas undertaking of the Middlesbrough Corporation, was discussed by Mr. H. C. HONEY (Director of Gas Administration) and the representatives of the Corporation, at the offices of the Board, on Monday, July 21. Originally there was opposition to some of the proposals in the Order, which would have been the subject of inquiry on that day, but agreement between the parties was reached beforehand.

Among the proposals of the Order is one to extend the Corporation's limits of supply of gas to include the parish of Nunthorpe, in the rural district of Stokesley, and part of the parish of Stainton, in the rural district of Middlesbrough. Other provisions give power to the Corporation to appropriate and use lands (already in the hands of the Corporation) for the purposes of the gas undertaking, to construct gas-works on those lands, to acquire further lands by agreement, and to borrow money. There are included a number of clauses dealing with the supply of gas, all in the usual form.

Mr. R. H. FOX (Messrs. Torr, Durnford, & Co., Parliamentary Agents), for the Corporation, said objections had been lodged by the Stockton Corporation and the North Riding of Yorkshire County Council, but agreement had been reached. The dispute with the Stockton Corporation arose with regard to the clause empowering the Middlesbrough Corporation to supply in part of the parish of Stainton, which adjoined the Middlesbrough limits of supply. The Stockton Corporation had had powers to supply in the parish for over seventy years, but had not exercised their powers. On the other hand, the Middlesbrough Corporation had carried their mains to within about 2000 yards of the village of Stainton. They had been approached by some of the inhabitants and asked to give a supply, and it was in consequence of this that powers were sought. The agreement which had been come to was that if the Middlesbrough Corporation exercised their powers to supply within two years, and had satisfied the Board of Trade that they had laid suitable mains and were giving a sufficient supply within the portion of Stainton they sought power to supply, and the Board of Trade issued a certificate to this effect, the powers and obligations of the Stockton Corporation to supply gas in Stainton village should cease. The effect of the present Order would be to leave a further portion of the parish of Stainton within the area of supply of the Stockton Corporation; but it would probably be more convenient for Middlesbrough to supply in that portion of the parish, if there were a demand. Therefore the Middlesbrough Corporation had undertaken that, at the next convenient opportunity, they would include power to supply in the remainder of Stainton parish, and repeal Stockton's powers in that portion. The Middlesbrough Corporation had also arranged with the Middlesbrough Rural District Council—in whose district Stainton was situated—that there should be power to charge an extra 1s. 4d. per 1000 c.ft. in Stainton as compared with Middlesbrough. The present price in Middlesbrough was 3s. 6d. per 1000 c.ft.—*i.e.*, 4s. 4d., less a discount of 10d.

As to borrowing powers, it was proposed to authorize the Corporation to borrow £73,500 in respect of the appropriation of land and the erection of an additional gasholder; the requisite sum for paying the costs of obtaining the Order; and, with the sanction of the Minister of Health, such further sums as might be necessary for the purposes of the gas undertaking, including the provision of working capital. The periods of repayment asked for were fifty years for the £73,500, and five years for the amount borrowed in respect of the costs of the Order. There was some discussion arising out of the borrowing powers, and the Ministry of Health raised objections.

Mr. W. J. HARDING (Ministry of Health) said the Ministry did not know how much of the money was in respect of the appropriation of land, but he took it that it was rather less than £5000. He understood, however, that a loan for the purchase of the land had already been sanctioned by the Ministry of Health. The Ministry did not wish to have two loans outstanding for the same purpose.

Mr. *Preston Kitchen* (Town Clerk of Middlesbrough) said the money for the acquisition of the land was borrowed on the security of the borough fund, and it was being paid back out of that fund. The clause providing for the appropriation of the land was to give power to recoup the borough fund to the extent of the payments already made out of that fund in respect of interest and repayment of the loan sanctioned by the Ministry, and then to make the gas undertaking responsible for the outstanding portion of the loan. The land in question was first acquired by the Corporation because they wished to reserve it for the industrial development of the district, and did not want houses built there.

Mr. HONEY said he did not wish to create a very inconvenient precedent. The real point was that the Corporation wanted to create a fresh loan in order to recoup the borough fund for money which had been properly paid out of revenue. Was that necessary?

Mr. FOX said it was, and he saw no objection when the borrowing undertaking was getting a capital asset. Why should they take it over at less than cost price, and leave the borough fund to meet the loss?

Mr. HONEY remarked that the Ministry objected to borrowed money being applied to revenue account. He did not know whether the Corporation and the Ministry would be content if it were provided that the full capital value of the land should be paid by the gas undertaking, in the way suggested in the Order, but that the proceeds of the loan, after disposing of the outstanding debt, should go to reducing other liabilities falling on the borough fund.

Mr. FOX then put forward the suggestion, which was first made by Alderman Sir Joseph Calvert (Chairman of the Gas Committee of the Corporation), that the gas undertaking should discharge the outstanding loan out of their revenue, and repay to the borough fund, out of revenue, the interest and sinking fund charges which had already been paid out of the borough fund. This preserved the Corporation's principle, and he hoped it satisfied the Ministry. The land would then be vested in the gas undertaking.

This course was agreed to.

The decision involved an adjustment of the £73,500 for which borrowing powers were sought in the Order, by deducting the purchase price of the land, and, at the Town Clerk's suggestion, the £5000, which was to cover the purchase of the land and the erection of the boundary wall was halved; it being considered that £2500 was sufficient for the wall. Therefore, the total was reduced from £73,500 to £71,000.

Mr. FOX, dealing with the question of the period of repayment, said in addition to the £2500 for the wall, the cost of construction of the new gasholder and tank, with the necessary foundations, which it was proposed to erect on the new lands, was £55,000; a station governor and house, £2500; a gas main between the existing and proposed gas storage lands, £7000; and boosting plant on existing storage lands, £4000.

Mr. *C. F. Blincoe* (Engineer and Manager of the gas undertaking), who had prepared the above estimate, of which Mr. W. Doig Gibb, the Consulting Engineer, was cognizant, said that, having regard to the life of those works, fifty years was a proper period for repayment.

Mr. HONEY said he believed the usual period for the repayment of a loan for erecting a gasholder was thirty years.

Mr. FOX complained that this period was too short, and placed an undue burden on the consumer. One of the gasholders at the works had been in use since 1881, and was still in excellent condition; furthermore, it was anticipated that it would last at least another twenty years, which would give it a life of 63 years. If the Middlesbrough Corporation had a holder with a life of 63 years, was it reasonable that they should be cut down to a period of thirty years for works of this character, particularly when the estimate also included land?

Mr. *Blincoe* stated that the building for the station governor would be of brick, and would last about sixty years (the estimate of the cost of the building was £1500, and of the governor £1000). The main between the existing and proposed storage lands would be a 24-in. cast-iron one, and, having regard to the soil in which it would be laid, its life would be from eighty to a hundred years.

Mr. FOX agreed that the boosting plant and the station governor might bring the period down; but if they took an equated time, it could safely be said that the Corporation, in asking for fifty years, were not asking too much.

Mr. HONEY said it seemed to him, without working it out, that the equated period would be something like twenty-five to thirty years. This was not taking sixty years for the gasholder. The Board of Trade in a matter of this kind, were very reluctant to take a view different from that of the Ministry of Health, and he would very much prefer—as also, he believed, the Board of Trade would prefer, if he put it up to them to decide—to leave the periods for the redemption of loans to be determined hereafter by the Ministry of Health. If, however, the Corporation pressed for an equated period, and were prepared to take thirty-five years instead of fifty for the whole amount, he would put that in.

Mr. FOX said that, as the Corporation were anxious to get the Order through this session, they would take it and have done with it.

The therm system of charge has not yet been adopted by the Corporation, and Sir Joseph Calvert said that the quality of the gas supplied at present was 560 B.Th.U. per c.ft. The quality was fairly constant, and he submitted figures which showed that it had only varied between 550 and 560 B.Th.U. during the last two years.

This concluded the proceedings.

SETTLE GAS ORDER.

An inquiry into a Special Order, proposed to be granted by the Board of Trade, under section 10 of the Gas Regulation Act, to the Settle Gas Company, was to have been held at the offices of the Board by Mr. H. C. HONEY (Director of Gas Administration) on Tuesday of last week. Apparently, however, all opposition to the proposals in the Order was withdrawn, and the inquiry was not held.

The Order proposes to empower the Settle Gas Company to construct gas-works on certain lands, and to raise additional capital up to £8000, but the total share capital is not to exceed £20,000. There are provisions as to the limitation of dividends. The borrowing powers are limited to half the issued capital; and the interest to be paid on borrowed money is not to exceed 7 p.ct., without the consent of the Board of Trade. A clause provides that, after three years from the date of the Order, the Board of Trade may, if they think fit, fix a standard price for gas, and in this event provisions in the schedule to the Order, providing for a change-over from a maximum to a standard price and applying the sliding scale, are to come into operation. There are a number of other common clauses in the Order. Power is taken to supply in bulk, with the usual provision that no bulk supply shall be given by the Company outside their limits unless they are also able to satisfy requirements of consumers within the limits of supply.

We understand that there was originally opposition from owners of houses facing the site on which it is proposed to erect gas-works, and they required a row of trees or some effective screen to hide the proposed works from their property. The position with regard to these inquiries is that, under the terms of the Gas Regulation Act, the Board of Trade must hold a public inquiry into the provisions of a proposed Order, unless no objection is offered, or unless any objection is considered by the Board to be frivolous. In this case, therefore, notification had been given that the inquiry would be held on July 22 at the Board of Trade; but, as no objectors appeared at the appointed time, and as the Board had already been informed by the Company's agents that there was a prospect of agreement, it is presumed that all opposition is withdrawn.

Birmingham Corporation Accounts.—We have received from Mr. J. R. Johnson, F.S.A.A. (Treasurer of the City), a copy of the Birmingham financial statement for the year ended March 31 last. This shows that the total revenue of the gas undertaking was £2,529,823, while the working expenses amounted to £2,356,322, leaving a gross profit of £173,501. The loan charges were £131,245, and consequently a net profit of £42,256 remained, all of which has been appropriated for the rates. The sum standing to the credit of the reserve fund at the close of the financial year was £78,963, which compares with an amount of £78,280 at the end of the previous financial period.

BURTON-UPON-TRENT GAS-WORKS REPORT.

The report of the Burton-upon-Trent Gas-Works for the year ended March 31 last (which is signed by Mr. A. H. Yeomans, the Chairman of the Gas Committee) states that the revenue amounted to £123,758, and the working expenses to £95,418, the gross profit being £28,340. Deducting loan charges and other items, including £7882 for new meters, stoves, &c., the net profit for the year was £7284, as compared with £14,730 for the previous year. Of the £7284, there has been transferred to the reserve fund £5284, and in aid of the rates £2000. Thus the reserve fund has been increased from £22,762 to £27,919.

The working results, for which Mr. W. Wilson (the Engineer and Manager) was responsible, show that the total sales of gas, at 411,421,800 c.ft., were slightly more than in the previous year. The percentage of the make unaccounted for was 4·06. The make of gas per ton of coal carbonized was 13,821 c.ft., of 490·9 B.Th.U. gross; and the average price received, 4s. 2·22d. per 1000 c.ft., which compares with 4s. 7·42d. for the year before.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The only feature to record concerning the past week is the continued lack of trade. The improved tendency for Northumberland steams in the previous week has been maintained, but values have not made any further headway, and the better sentiment has not spread to other coals. Coking sorts are a very nominal market at 18s. to 20s. f.o.b., with scarcely any trade passing. Best quality gas is 21s. 6d. to 23s., according to colliery position; but makers are not offering for forward contracts at the lower figure. Wear Specials are called 23s. to 23s. 6d.

The ascertainments which will decide August wages are due, and will no doubt show some reduction in rates, due to bad trade in the last three months. Any possible fall in wages has, however, undoubtedly been fully discounted in prices which have been ruling of late, and very few collieries could accept lower figures, even with wages at the minimum. Financial difficulties on the Continent are causing consumers to limit their requirements to bare necessities, and these are, unfortunately, being supplied to a large extent by cheap and increasing quantities of Ruhr coal.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

There is no change in the coal trade in Yorkshire and Lancashire. The demand for domestic and industrial fuel both at home and abroad is very small, particularly in the West Riding of Yorkshire. The public have not taken the hint to lay in stores for next winter, and thus help the miners to work full time during the summer. The collieries are as a consequence only working about three days a week. Prices are at rock bottom at present; but special prices can be arranged in the retail trade for storing purposes.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

The bolder stocking of coal against the winter pinch remains the outstanding feature. Gas undertakings have been taking deliveries more freely than usual. A few special bargains have been made for spot lots which collieries wished to clear. General industrial fuel has been in very slow demand. Values have weakened, but less perhaps on account of the shrinkage of consumption than because of the disproportionate output of smalls and slacks owing to the stimulated demand for household qualities. D.S. nuts have been obtainable at 6d. to 1s. below mid-July prices. The price has been determined in most cases by the size of the order and the destination. Slacks have depreciated rather more markedly. On the other hand, there is a stronger tendency in regard to house coals. Exceptional inducements to buyers have been in many cases withdrawn by the collieries. There has even been some suggestion of stringency developing in the case of hard coals, deliveries being delayed. Supplies of furnace cokes now exceed the demand unmistakably.

TRADE NOTES.

Messrs. C. & W. Walker's Gasholder Contracts.

Messrs. C. & W. Walker, Ltd., have recently received orders for a number of spiral gasholders, including a three-lift holder and steel tank, 130 ft. in diameter, for the Crewe Gas-Works of the L.M. & S. Railway; a two lift holder with steel tank, 56 ft. in diameter, for Houghton-le-Spring; a three-lift holder with steel tank, 112 ft. in diameter, for Bangor (Ireland); and a two-lift holder with steel tank, 82 ft. in diameter, for Clay Cross. All these holders are fitted with Milbourne patent roller carriages and "Milcot" ladders. The firm have also received orders for a number of gasholders with guide-framing, including a three-lift holder for Montevideo and a two-lift holder for Aberystwyth; and they are now erecting a 2 million c.ft. holder at Oxford, a three-lift holder with steel tank for the Derby Gas Light and Coke Company, and a three-lift holder and steel tank for the Long Eaton Gas Company.

The Ministry of Health has sanctioned the borrowing of £8000 by the Accrington District Gas Board for the Whalley gas extension scheme.

GAS REGULATION ACT, 1920.

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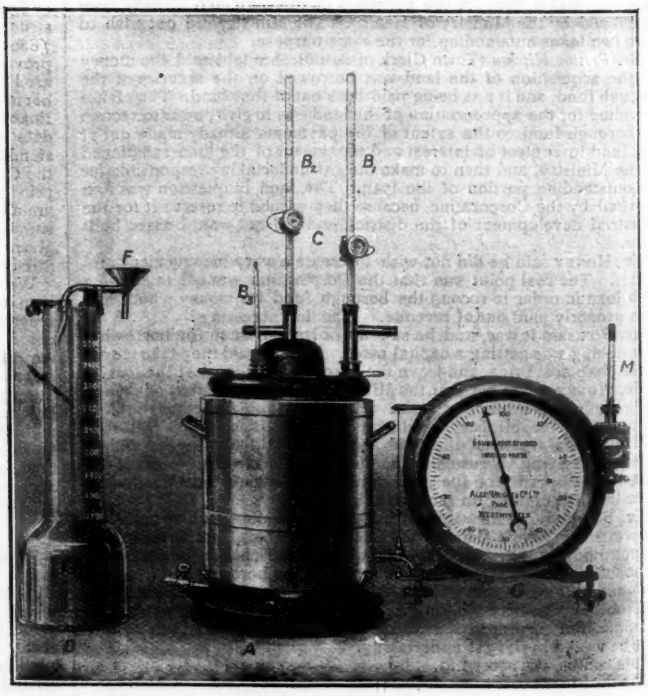


CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 28.

The London tar products market remains quiet, and although inquiries appear to be coming from the Continent for pitch to be shipped in the autumn, the movement so far is too small to be of consequence. The quotation is put at 60s. to 62s. per ton net f.o.b. makers' works. Creosote is nominally about 7d. net per gallon in bulk. Other products are unchanged. Tar for roads is still being delivered in large quantities, notwithstanding the damp weather.

Tar Products in the Provinces.

July 28.

The average values for gas-works products during last week were: Gas-works coal tar, 42s. to 47s. Pitch, East Coast, 55s. to 57s. 6d. f.o.b. West Coast—Manchester, 50s. to 52s. 6d.; Liverpool, 51s. to 52s. 6d.; Clyde, 52s. to 55s. Benzole 90 p.ct., North, 1s. 5d. to 1s. 6d.; crude 65 p.ct. at 120° C., 1s. to 1s. 1d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 8d. to 1s. 10d. Toluole, naked, North, 1s. 5d. to 1s. 6d., nominal. Coal tar crude naphtha in bulk, North, 7¼d. to 8d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, liquid, 6d. to 6½d.; Scotland, 5½d. to 5¾d. Heavy oils, in bulk, North, 9d. to 9¼d. Carbolic acid, 60 p.ct., 1s. 10d. to 1s. 11d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

Our correspondent for tar prices from the Manchester district writes: The average price realized for the sale of tar, according to the sliding-scale, for the month of May, was £2 19s. 11·05d.

Street Lighting at Kenilworth.—The question of accepting gas or electricity tenders for street lighting came before the Kenilworth Urban Council at their monthly meeting last week, when the Surveyor (Mr. S. Douglas) reported that, at current prices for gas and electricity, the extra cost over the present system of gas lighting, if 80 lamps were lit with electricity, and the remaining 119 were lit with gas, as at present, would be £20 per annum for ten years, due to the capital charges for converting the 80 lamps, but that thereafter there would be a saving of £51 per annum. The Gas Company now intimate that if gas is only used for 119 of the lamps, they will withdraw the whole of the 12½ p.ct. discount which they at present allow. The Gas Committee resolved that the tender of the Kenilworth Gas Company be accepted for the next lighting season.

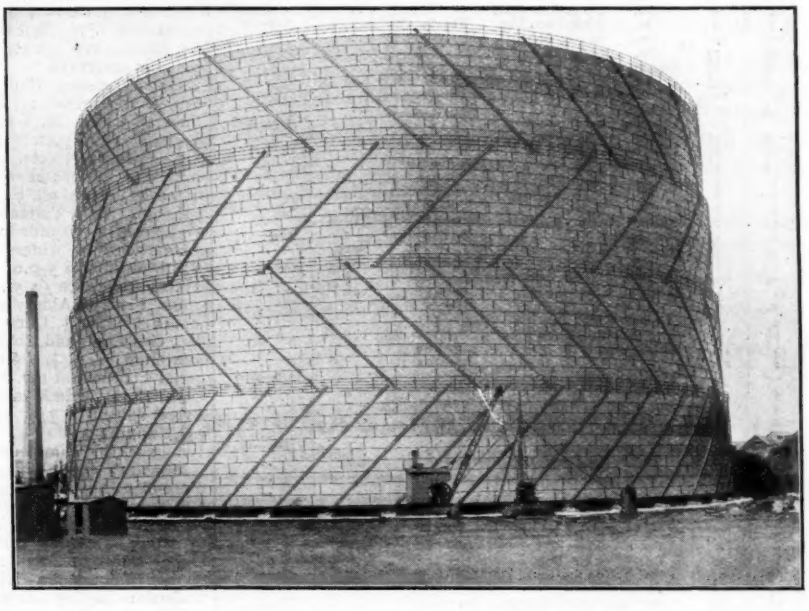
Mansfield Gas Employees' Roll of Honour.

The employees in the Mansfield Corporation Gas and Water Departments have erected a roll of honour to those comrades who answered their country's call in the world conflict. The roll, which is in the form of a large picture designed by Mr. Claude L. Porter, one of the employees, has been hung in the Welfare Room. Last week the unveiling ceremony was performed by the Mayor (Mr. J. Harrop White). A short service was conducted by the Rev. D. Haseler, vicar of St. John's Church, Mansfield. A laurel wreath was placed on the memorial after the ceremony.

Biggleswade Gas Light and Coke Company, Ltd.

On Tuesday a petition presented by the Company asking the Court to confirm resolutions altering the form of constitution by substituting a Memorandum of Association in place of a Partnership Deed, came before Mr. Justice Romer. Mr. Sutcliffe said the Company was formed in 1839, and in 1874 was registered under the Companies Act, 1862. It was formed to supply gas to houses in and about the town of Biggleswade, and wished now to extend its area of supply, for which purpose it was proposed to purchase the undertaking of another Gas Company adjoining Biggleswade. It was thought that, while carrying out this purpose, it would be as well to alter the form of constitution by substituting a modern Memorandum and Articles of Association in place of a Deed of Partnership. It was also proposed to alter the name of the Company to the Biggleswade and District Gas Company. His Lordship, after considering the new clauses of the Memorandum, sanctioned the alteration.

Wandsworth Gas Company's Standard Price.—The Public Control Committee, in a report prepared for this week's meeting of the London County Council, recommended that application be made to the Board of Trade for an Order reducing the standard price applicable to the Wandsworth, Wimbledon, and Epsom District Gas Company. From a report by Mr. Arthur Valon, M.Inst.C.E., which they have had before them, they are satisfied that, in view of the fall in costs since the Board of Trade in 1921 fixed the present standard prices, there is a strong case for a substantial reduction; but they admit that, "in the event of a reduction in the standard price, the immediate effect upon the consumer may be slight, inasmuch as the Company have on several occasions since 1921 reduced the price of their gas, and are now charging 7·8d. a therm in the Wandsworth limits, 8·8d. a therm in the Wimbledon limits, and 10d. a therm in the Epsom limits. These figures compare with 8 6d. a therm charged by the Gas Light and Coke Company, and 8 8d. a therm charged by the Commercial Gas Company." The present standard price of gas, the Committee pointed out, is 16·6d. a therm for the Wandsworth and Epsom limits, and 14·6d. a therm for the Wimbledon limits.



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STOCK MARKET REPORT.

THE proceedings of the Allied Conference are still being closely watched on the Stock Exchange. At the beginning of the week the progress made was giving general satisfaction, but the loan difficulties, which are the pivot of all the deliberations, have yet to be settled. Consequently, bull operations had not yet come into play and markets were dull. In addition the account week and the holiday season combined in preventing any extension of business.

Home Government stocks were perhaps a little lower on the week. In this market the 5 p.ct. War Loan at 101 3/16 continues to be the most attractive trustee investment, realizing £5 17s. 9d. p.ct. per annum after allowing for redemption. Indian Government loans can be bought at prices which give a higher return on the money invested, and are very attractive purchases. Home Rails were firm on the dividend announcements, most of which were at the same rate as paid in 1923. Metropolitan Railway increased its distribution from 1½ p.ct. to 2 p.ct. Argentine Rails have been slightly affected in sympathy with Brazils, but rallied at the end of the week.

In the Gas Market the transactions recorded were about normal. Three further London Companies' dividends have been announced. The Gas Light at the rate of £5 6s. 8d. p.ct. per annum, the Commercial at £6 p.ct. per annum, and Tottenham "A" at £8 p.ct. per annum and "B" £6 10s. p.ct. per annum. The former two Companies are now working under a revised standard price, and it will be of interest to investors in gas stocks to know that for the current half-year, assuming a distribution at the full authorized dividend and calculated on the current market price, the yield p.ct. per annum will be as follows:

	Price of Gas per Therm	Market Price.	Authorized Dividend.	Approximate Yield.
	d.		£ s. d.	£ s. d.
Gas Light .	8·6	92—94	5 6 8	5 17 2½
Commercial.	8·8	88—93*	5 14 8	6 6 8

* *Ex* div. †Calculated on an *ex* div. price of 91.

The following transactions were recorded:

On Monday, Aldershot "C" 83, Brentford "A" 104½ *ex* div., "B" 103½, 104½ *ex* div., British 117⅞, Commercial 3½ p.ct. 93¾, Continental Union 7 p.ct. preference 80, European 8, 8 5/32, 8¼, Gas Light and Coke 92½, 92⅝, 92¾, 92⅞, 93⅛, 93¼, 93⅜, 4 p.ct. preference 81, 3 p.ct. debenture 62, Imperial Continental 165⅜, 166, 167, 168, Primitiva 5s. 6d., 6s. 3d., 4 p.ct. debentures 73½, South Metropolitan 99, 99⅝, 99⅞, 100, 3 p.ct. debenture 61 *ex* div. Supplementary prices, Aldershot new "C" 82⅜, 83, Southend-on-Sea 4 p.ct. debenture 78, 78½, Tunbridge Wells 7 p.ct. debenture 100, 100½.

On Tuesday, Brentford "A" 104 *ex* div., "B" 104 *ex* div., British 4 p.ct. debenture 75⅜, European 8½, Gas Light and Coke 92½, 92⅝, 93, 93¼, 93⅜, Imperial Continental 166½, 167½, Montevideo 56¼, 56½, 57½, Primitiva 5s. 9d., 5s. 10d., 5s. 10½d., 6s., South Metropolitan 99½, South Suburban 5 p.ct. debenture 98, 98⅜. Supplementary prices, Crowborough ordinary 47, Leatherhead 5 p.ct. 10, 10½.

On Wednesday, Alliance and Dublin 4 p.ct. debenture 63, 63⅜ *ex* div., Cape Town 4½ p.ct. preference 6½, Commercial 3½ p.ct. 95, Gas Light and Coke, 92½, 92⅝, 93, 93⅛, 93¼, 4 p.ct. preference 81, Imperial Continental 165, 167½, Primitiva 6s., 6s. 3d., South Metropolitan 6½ p.ct. debenture 103, South Suburban 5 p.ct. debenture 97⅜, Tottenham "B" 102⅜, 103. Supplementary prices, British, Norwich 3½ p.ct. debentures 64.

On Thursday, Bournemouth "B" 12 2/32, 6 p.ct. preference 11⅛, British 117, 118⅛, Continental Union 28, Gas Light and Coke 92½, 93, 93⅛, 93⅜, 3½ p.ct. maximum 63⅜, 64½, 4 p.ct. preference 81, 3 p.ct. debenture 61½, 61⅜, 63, Imperial Continental 166, Oriental 100½, Primitiva 6s. 1½d., 6s. 3d., South Metropolitan 99½, 99⅜, 99⅝, 100, Tottenham "B" 101 *ex* div., Wandsworth, Wimbledon stock 111½. Supplementary prices, Aldershot new "C" 82⅜, 83, North Middlesex 5 p.ct. preference 89, Pinner 6 p.ct. preference £5 5s. 6d.

On Friday, Aldershot "C" 83, Bournemouth "B" 12 11/16, Commercial 3½ p.ct. 90½ *ex div.*, Gas Light and Coke 92⅜, 93⅛, 93¼, 3½ p.ct. maximum 64, 64½, 4 p.ct. preference 81, Imperial Continental 167, Maidstone 5 p.ct. 127½, Oriental 101, Primitiva 6s. 6d., 4 p.ct. (Buenos Ayres) debenture 55⅛, 56, South Metropolitan 99⅜, Southampton 4 p.ct. debenture 75, Wandsworth, Wimbledon 5 p.ct. 112.

Monetary conditions were a little easier at the end of the week, but as high a rate as 3 p.ct. was paid for overnight accommodation. At no time did the rate fall below 2½ p.ct. As expected, Treasury Bills were allotted at a higher rate—viz., £3 12s. 9·94d. There were further rumours of a rise in the Bank rate, but traders are hoping this will be avoided.

The value of the sterling in New York continued to rise, and after touching 4.40⅜ closed at 4.39 29/32. The continued improvement is attributed to the abundant money supplies on the other side of the water. Francs depreciated slightly on the week and closed at 86.40. Belgian francs as usual followed the course of the Paris cheque; but Dutch florins moved against this country, closing at 11.50⅜.

Silver was steady and finished 9/16d. up, at 34⅝d. per oz.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5, 1923. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. July 25.	Rise + or Fall − on Week.	Transaction Lowest and Highest Prices.
£			% p.a.	% p.a.				
131,978	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C.	81—84	..	83
235,492	,,	,,	4	4	Do. 4 p.c. Pref.	70—73	..	..
1,551,868	,,	Apr. 3	5½	6	Alliance & Dublin Ord.	63—68	..	..
374,000	,,	July 10	4	4	Do. 4 p.c. Deb.	60—65	..	63—63½
280,000	5	May 22	8	8	Bombay, Ltd.	5—5½	..	..
100,000	10	Mar. 6	8½	8½	Bournemouth 5 p.c.	12½—13½	..	..
383,110	10	,,	7	7	Do. B 7 p.c.	12—13	..	12 12/16—12½
150,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	11½
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb.	54—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—79	..	..
992,045	,,	July 10	6 5/10	6 5/10	Brentford A Con.	100—105	..	104—104½
990,300	,,	,,	6½	6½	Do. B New	100—103	..	103½—104½
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	87—92	..	..
306,690	,,	June 12	4	4	Do. 4 p.c. Deb.	75—80	..	..
181,337	,,	,,	—	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Mar. 6	11½	11½	Brighton & Hove Orig.	170—175	..	..
244,200	,,	,,	8	8½	Do. A Ord.	125—128	..	..
1,287,300	,,	Feb. 21	5	5	Bristol 5 p.c. max.	92—93*a*	..	..
855,000	,,	Mar. 20	—	7	British Ord.	117—122	..	117—118½
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	118—123	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—77	..	75½
100,000	10	May 22	6	8	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Apr. 24	4½	4½	Do. 4½ p.c. Pref.	6—7	..	6½
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb.	71—76	..	..
626,860	,,	July 24	6	6	Cardiff Con. Ord.	97—100*	−2	..
237,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb.	103—106	..	..
157,150	,,	Mar. 6	5	6½	Chester 5 p.c. Ord.	88—93*b*	..	..
1,513,280	,,	July 24	6	6	Commercial 4 p.c. Cap.	88—93*	−2	..
560,000	,,	,,	6	6	Do. 3½ p.c. Cap.	88—93*	−2	90½—95
475,000	,,	June 12	3	3	Do. 3 p.c. Deb.	56—59	..	..
800,000	,,	14 Jan. 15	—	—	Continental Union, Ltd.	27—32	..	28
200,000	,,	June 12	7	7	Do. 7 p.c. Pref.	77—82	..	80
660,000	,,	Mar. 6	6½	6½	Croydon sliding scale	101—104	..	..
284,975	,,	,,	5	5	Do. max. div.	84—87	..	..
492,270	,,	Feb. 21	3	4½	Derby Con.	108—110*c*	..	..
55,000	,,	July 10	4	4	Do. Deb.	74—76*a*	..	..
209,000	,,	Apr. 3	5	5	East Hull 3 p.c. max.	..	..	..
1,002,180	10	July 24	2	6	European, Ltd.	7½—8½*	−⅛	8—8 8/32
16,503,045	Stk.	Feb. 7	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	92—94	..	92½—93½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	62—65	..	63½—64½
4,062,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	80—83	..	81
4,761,930	,,	June 12	3	3	Do. 3 p.c. Con. Deb.	61—64	..	61½—63
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	,,	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Mar. 20	6½	6½	Hastings & St. L. 5 p.c. Conv.	91—96	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	76—81	..	..
70,000	10	May 8	10	10	Hongkong & China, Ltd.	16—17	..	..
86,600	Stk.	Mar. 6	9½	10	Hornsey 7 p.c.	143—148	..	..
1,976,000	,,	May 22	10	30	Imperial Continental Cap.	165—170	..	165—168
263,950	,,	Feb. 7	3½	3½	Do. 3½ p.c. Red. Deb.	69—72	..	..
235,242	,,	Mar. 6	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Feb. 21	5½	5½	Liverpool 5 p.c. Ord.	90½—91½*b*	..	91
600,000	,,	Mar. 20	7	7	Do. 7 p.c. Red. Pref.	103—106*b*	..	106
165,736	,,	Feb. 21	9	8	Maidstone 5 p.c. Cap.	124—129	..	127½
63,480	,,	June 26	3	3	Do. 3 p.c. Deb.	53—58	..	..
75,000	5	,,	5	7	Malta & Mediterranean	3½—3¾	..	..
541,920	Stk.	June 12	4	4	Montevideo, Ltd.	54—59	+2	56½—57½
1,875,892	,,	July 24	5½	5	Newcastle & Gateshead Con.	83—84*d*	−2½	..
250,166	,,	,,	4	4	Do. 4 p.c. Pref.	74—75*d*	−1½	..
529,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb.	70—70½*d*	−½	..
15,000	10	Mar. 6	11	11	North Middlesex 10 p.c.	16—17	..	..
75,940	10	,,	7 7/10	7 7/10	Do. 7 p.c.	11½—12	..	..
300,000	Stk.	May 8	9	7	Oriental, Ltd.	98—101	..	..
138,120	,,	June 26	7½	7½	Plym'th & Ston'house 5 p.c.	112—117	..	..
60,000	50	Mar. 6	13	13	Portsea Island B	102—105	..	..
100,000	50	,,	12	12	Do. C	98—103	..	..
2,289,909	1	—	—	—	Primitiva Ord.	⅛—¼	..	5/6—6/6
341,400	100	June 2	4	4	Do. 4 p.c. Red. Deb.	72—75	+2	73½
600,000	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	53—56*	−1	..
220,335	,,	June 26	4	4	Do. B. Aires 4 p.c. Rd. Db.	54—57	..	55½—56
321,670	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	54—57	..	..
150,000	10	Mar. 20	6	6	San Paulo 6 p.c. Pref.	7—7½	+½	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	41—43	+1	..
270,000	Stk.	Mar. 20	5	5/8/4	Sheffield A	99—101*a*	..	..
419,968	,,	,,	5	5/8/4	Do. B	99—101*a*	..	..
1,047,000	,,	,,	5	5/8/4	Do. C	99—101*a*	..	..
90,000	10	June 12	6	8	South African	7—9	..	..
6,609,895	Stk.	Feb 21	5	6½	South Met. Ord.	98½—100½	..	99—100
102,580	,,	July 10	5	5	Do. Red Pref.	96—98	..	..
1,895,443	,,	,,	3	3	Do. 3 p.c. Deb.	58—61	..	61
734,000	,,	Mar. 6	6½	6½	Do. 6½ p.c. Red. Deb.	103—105	..	103
91,500	,,	,,	8½	8½	South Shields Con.	136—138*d*	..	..
1,087,795	,,	Feb. 21	6	6½	South Suburban Ord. 5 p.c.	101—106	..	..
368,837	,,	June 26	5	5	Do. 5 p.c. Deb.	93—98	..	97½—98½
647,740	,,	May 8	6	5	South'mpt'n Ord. 5 p.c. max.	85—88	..	..
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	73—78	..	75
250,000	,,	Mar. 6	7	7	Swansea 7 p.c. Red. Pref.	104—106	..	..
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb.	102—104	..	..
120,000	,,	July 24	8	8	Tottenham District A 5 p.c.	116—119*	−4	..
882,275	,,	,,	6½	6½	Do. B 3½ p.c.	99—102*	−2	101—103
181,255	,,	June 12	4	4	Do. 4 p.c. Deb.	76—80	..	..
258,251	,,	Mar. 20	5	7/14/4	Tynemouth Con. and New Wandsworth, Wimbledon, and Epsom—	87—89*d*	..	..
30,000	,,	July 10	9½	9½	Wandsworth A 5 p.c.	132—137	..	..
255,636	,,	,,	7½	7½	Do. B 3½ p.c.	110—115	..	..
108,075	,,	,,	6/7/9	6/9/6	Do. C	96—101	..	..
240,863	,,	,,	6/7/9	6/9/6	New Ordinary	..	..	..
352,000	,,	,,	7½	7½	Wimbledon 5 p.c.	110—115	+2	112
98,000	,,	,,	7½	7½	Epsom 5 p.c.	115—120	..	..
88,416	,,	June 26	3	3	3 p.c. Deb.	55—60	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *s.*—Sheffield. * Ex. div.

Buckie Gas Light Company, Ltd.—The Company's profits for the year ended April 15 amounted to £2048. A dividend of 8 p.ct., free of tax, was declared; and after allowing for depreciation, the balance (£250) was added to the sum of £739 3s standing at credit of profit and loss. The price of gas was recently reduced by 5d. per 1000 c.ft.

Redhill Capital Over-Subscribed.—The issue of £20,000 of 5½ p.ct. irredeemable preference stock in the Redhill Gas Company which Messrs. A. & W. Richards offered for sale by tender on behalf of the Directors, was over-subscribed at prices ranging from £101 down to the minimum of £95 p.ct. The average price of allotment was £96 19s. 9d. per £100 of stock.

Helston Gas-Works Purchase Scheme.—The report of the deliberations of the Committee appointed to deal with the proposed purchase of the Helston Gas Company's undertaking was presented to the Town Council last week by the Mayor (Alderman H. Toy). His Worship stated that arrangements were being made to ensure a better supply of gas to the consumers. Certain repairs were essential at the earliest possible moment, in order to secure a good and efficient supply next year. The Committee had arranged with the Gas Company for carrying out repairs and improvements, and if, through any unforeseen circumstances, the gas-works did not become the property of the Council, the Gas Company had agreed to pay the Council any sum outlaid by them. The report was adopted. The Mayor said that some members of the Council who were not members of the Special Lighting Committee had expressed a desire to become so. He proposed, therefore, that the whole Council should be appointed as the Gas and Lighting Committee; and this was agreed to.

A New Holder for Aberystwyth.—The Aberystwyth Gas Company are erecting at Llanbadarn a new gasholder, the foundation of which will involve the driving of 116 concrete piles. A reinforced concrete platform will be laid over the piles, and the whole ultimately strengthened by iron girders. The new holder will have a capacity of 200,000 c.ft.

At an estimated cost of £1217, the Hereford Town Council, at a special meeting last week, decided to provide a new gas main to supply the southern area of the city—an undertaking which it was held was long overdue.

The Mond Tar By-Products Syndicate, Ltd., of No. 47, Victoria Street, Westminster, S.W., has been registered as a private company, to manufacture and deal in chemicals and allied products. The capital is £25,000 in shares of £1 each.

The Directors of the Tottenham District Light, Heat, and Power Company have declared dividends in respect of the half-year ended June 30 at the rates of 5 p.ct. per annum on the preference stock, 8 p.ct. per annum on the "A" stock, and 6½ p.ct. per annum on the "B" stock—all less income-tax, and payable on Aug. 12.

The Birmingham Corporation propose to spend during 1924-25 £1,739,227 upon unemployment relief works. This figure includes £80,000 (of which £31,000 will represent wages) in the relaying, &c., of mains consequent upon road works; telpher and screening plant at the Swan Village Works, at a cost of £13,000; and a motor garage at the Windsor Street Works, at a cost of £3000.

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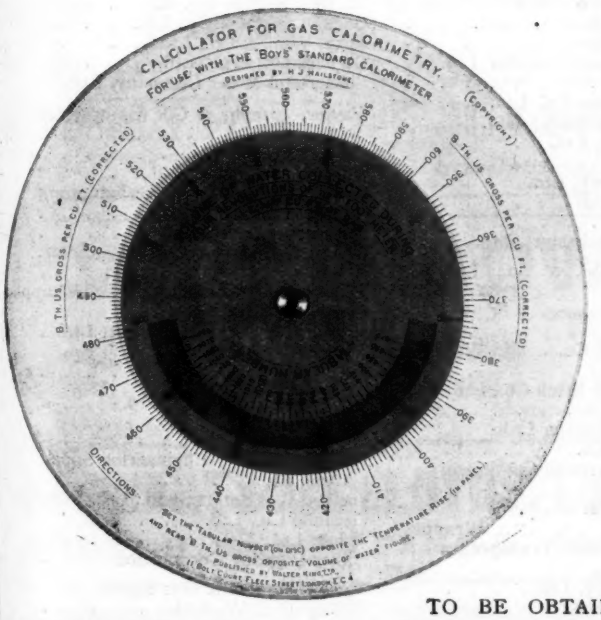

Designed by Mr. H. J. HAILSTONE, of the Rochdale Corporation Gas Department.

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(See Article in "JOURNAL," May 21, p. 523.)

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